

6 OPERATING CONSERVATION PROGRAMS

6.1 MARBLED MURRELET CONSERVATION PLAN

6.1.1 Management Objective

Protect most of the best quality marbled murrelet occupied habitat on the property in a system of reserves and provide for improvement of habitat within the reserves during the life of the permit. Minimize the effects of management on populations within the reserves, and the effect on murrelets that may be using habitat authorized for harvest.

6.1.2 Conservation Measures

6.1.2.1 Establishment of Marbled Murrelet Conservation Areas and Other Protective Buffers

Establish the following MMCAs as described below.

- All MMCAs will be protected for the life of the permit. Timber harvesting is prohibited in the MMCAs and the Grizzley Creek complex, including salvage logging and other management activities that are detrimental to the marbled murrelet or marbled murrelet habitat for the life of the ITP. The outlines of the MMCAs are shown in Figure 2. More detailed overview maps are provided in Figure 2.5-4 of the FEIS/FEIR. The acreages of the MMCAs are as follows: Elk Head Residual, 351 acres; Cooper Mill, 704 acres; Allen Creek, 1,428 acres; Allen Creek Extension, 301 acres; Road 3, 564 acres; Owl Creek, 1,199 acres; Shaw Gift, 503 acres; Right Road 9, 318 acres; Road 7 and 9 North, 492 acres; Booth's Run, 784 acres; Bell Lawrence, 634 acres; and Lower North Fork Elk, 451 acres. The Grizzley Creek complex acreage is 1,409 acres.
- The Owl Creek MMCA will be protected for the life of the permit, and will include additions. Their outlines are also shown in Figures 3 and 4.
- The Grizzley Creek complex will include an additional 351 acres, as shown in Figure 4, and will be protected for the first five years of the permit. As described in the IA, at the end of five years, any portions of this area that have not been acquired for permanent protection by the state of California or others, and that still remain in PALCO's ownership, will be evaluated by a scientific review panel and USFWS and CDFG. The agencies will then make a finding as to whether allowing timber harvest and the other covered activities in the complex would jeopardize the marbled murrelet. If the agencies determine that harvest of the area would jeopardize the murrelet, the area would be protected as an MMCA for the life of the permit. If the agencies determine that harvest of the area would not jeopardize the species, the area would not be designated as an MMCA and would be managed in accordance with the HCP's OCP for covered lands outside of MMCAs.
- A process will be established for further delineation of boundaries of MMCAs and conditions within MMCAs within first year of the permit. Aerial photos, maps, written descriptions, and where feasible, global positioning system (GPS) points, will be used to describe boundaries. Videos will document existing conditions along all roads within MMCAs. When THPs are proposed in stands contiguous with

Figure 2

**Pacific Lumber HCP
Murrelet
Conservation
Areas
as Expanded
December 1998**

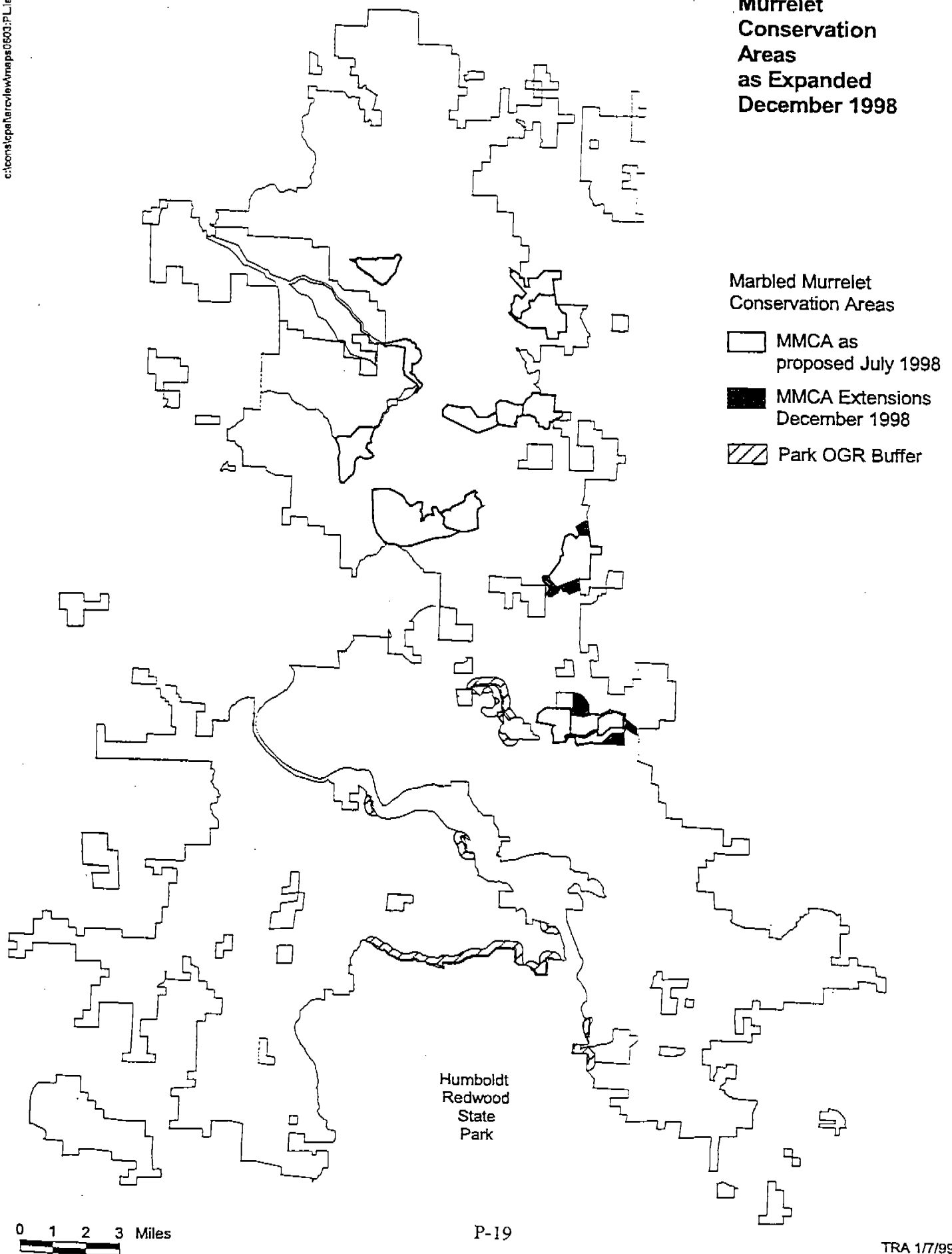
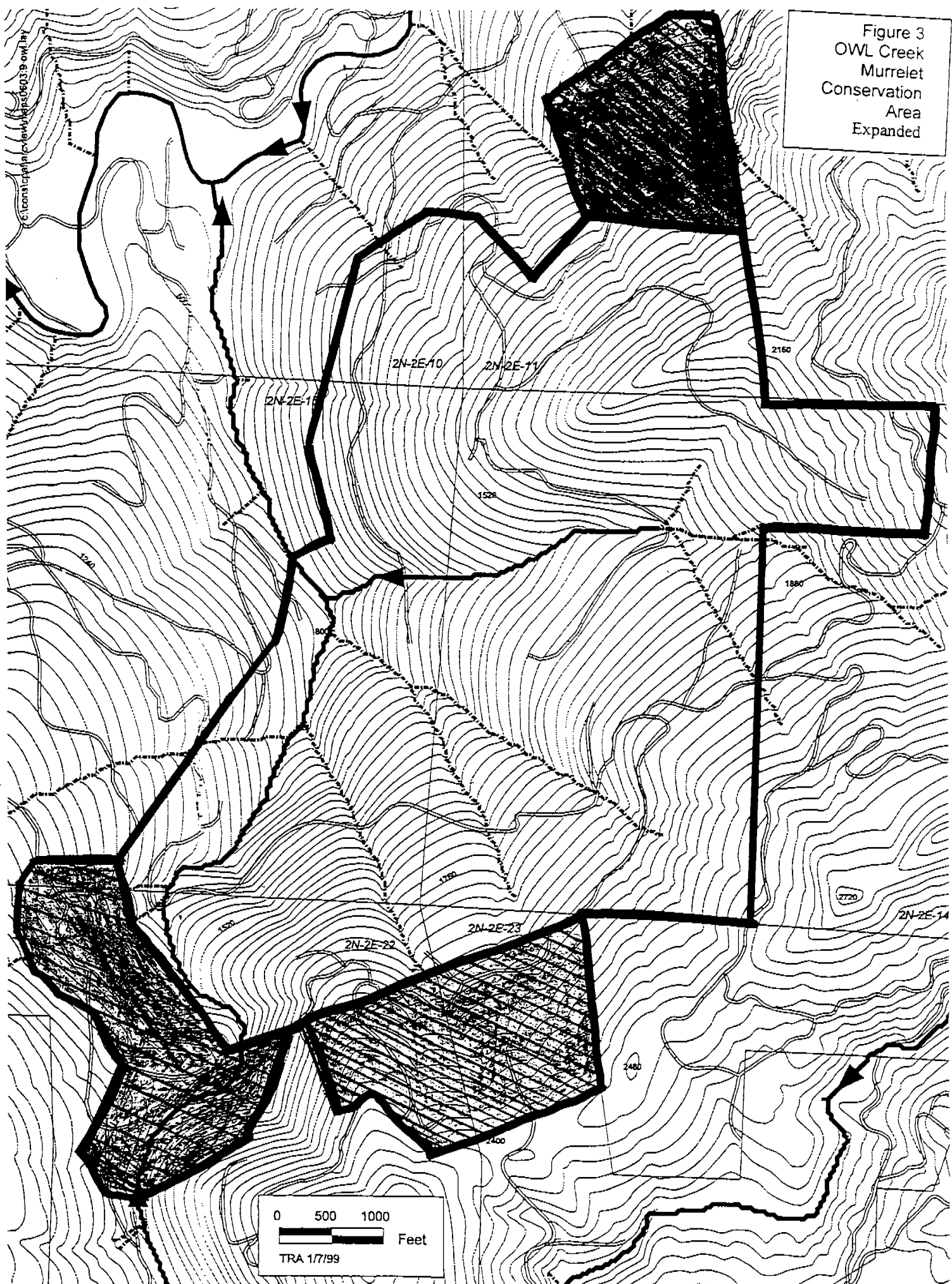


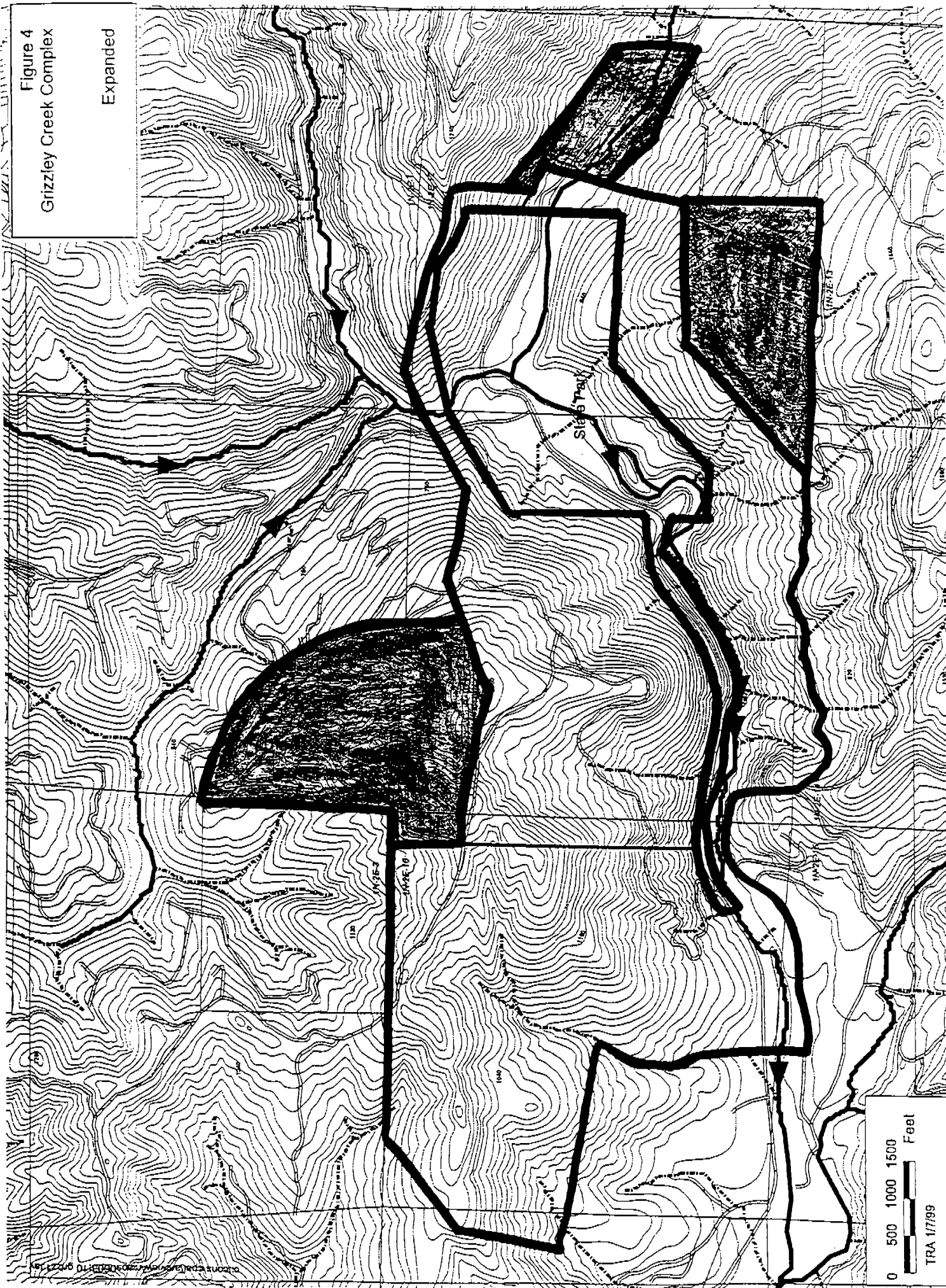
Figure 3
OWL Creek
Murrelet
Conservation
Area
Expanded



0 500 1000
Feet
TRA 1/7/99

Figure 4
Grizzley Creek Complex

Expanded



0 500 1000 1500 Feet
TRA 1/7/99

- MMCAs, formal land surveys will be conducted to establish boundaries prior to harvest.
- Buffers around old-growth habitat are applied to reduce the potential for access by avian predators and ameliorating climatic effects. To provide these benefits, the timber stand within the buffer should provide a high degree of canopy closure at a height as close to that of the old-growth habitat as possible. In some cases, where intervening features such as ridgelines and roads would substantially reduce the effectiveness of buffers, vegetated buffers may not be deemed necessary. Where the benefits of buffers could be attained using PALCO-owned property, the MMCAs were designed with 300-foot buffers incorporated within their boundaries. However in several instances, additional buffers are or may be appropriate. These additional instances are described in the following three bullets.
- Additional 300-foot buffers will be established at certain points along the south edge of the Headwaters Reserve and the northwest edge of the North Fork Elk MMCA. These buffers are identified in Figures 2 and 3.
- If PALCO acquires property bordering an MMCA, 300-foot, no-harvest buffers shall be established adjacent to the MMCA immediately, wherever residual or old-growth forest exists at the margin of the MMCA.
- Activities within the 300-foot buffers shall be restricted to those identified in Section 6.1.2.2.
- During the review of boundaries described in the fourth bullet above, the mapped buffers will be examined to ensure that they meet the objectives of protection of MMCA values to the maximum extent feasible and to consider whether additional buffers should be added to meet the objectives. In addition to the need for species protection, this process will fully consider limitations of effectiveness due to intervening features and the practicality of delineation (for instance, use of existing features such as roads and ridges versus establishing boundaries by performing land surveys).

6.1.2.2 Activities in MMCAs

6.1.2.2.1 Management in the MMCAs

Management shall be consistent with the goals and objectives of the MMCAs and, except as expressly provided here, shall be conducted in consultation with the USFWS and CDFG. The goals and objectives of the MMCAs are as follows:

- Prohibit timber harvesting, including salvage logging and other management activities detrimental to the marbled murrelet or marbled murrelet habitat within any area designated as an MMCA. Consistent with this prohibition, PALCO will only engage in MMCA conservation activities, as identified in Section 6.1.2.2.2 and other management activities identified in Section 6.1.2.2.1.
- Maintain the value of currently suitable marbled murrelet nesting habitat in the MMCAs.
- Recruit suitable marbled murrelet nesting habitat in old-growth residual stands in the MMCAs.
- Provide buffering for, and contiguity of, suitable and recruitment nesting habitat in young-growth stands within the MMCAs.

6.1.2.2.2 MMCA Timber Removal

PALCO is not required to undertake any such management in the MMCAs.

- Old-growth stand components within MMCAs are to be dedicated to retention and enhancement of murrelet nesting habitat values.
- Residual stand components are to be managed to recruit functional murrelet nesting habitat.
- Second-growth stand components within and outside of residuals are to be managed to buffer old-growth and residual habitat and to provide mature forest contiguity throughout MMCAs. Any thinning allowed in the MMCAs would be done within second-growth to accelerate recruitment of second-growth trees into a mature condition that buffers residual and old-growth canopy structure. Any permitted thinning shall occur outside of the murrelet nesting season and without the construction or reconstruction of roads. No helicopter yarding shall be conducted.
- With the exception of those activities identified as MMCA conservation activities in this section, any activity involving the removal of timber from an MMCA, including pre-commercial and commercial thinning, shall be allowed only on a case-by-case basis and only if the wildlife agencies determine that the specific activity will be beneficial to the marbled murrelet and its habitat and is in conformance with the Aquatics Conservation Plan. Such timber removal activities will be allowed only at the specific written request and/or written approval of the wildlife agencies in advance of such activity, following compliance with all applicable laws and regulations, including NEPA and CEQA. Such compliance shall include determining whether the environmental documentation in existence at that time adequately discloses the impacts of the proposed activity to ensure compliance with NEPA and CEQA.

6.1.2.2.3 MMCA Conservation Activities

Certain activities, roads, and other facilities within the MMCAs on PALCO's lands will remain available for use, consistent with the Aquatics Conservation Plan and the IA regarding this Plan and subject to the conditions below. These activities are deemed to be compatible with, or beneficial to, protection of the marbled murrelet and other covered species and their habitats within the MMCAs:

- Active roads within MMCAs may be used, maintained, stormproofed, upgraded, closed, or decommissioned as limited by Section 3.1.1(a)(1) of the IA.
- Properly licensed and permitted game hunting—including firearm discharge—may continue, during the appropriate seasons, from September 16 of each year through March 23 to avoid potential disturbance to nesting murrelets.
- Maintaining, stormproofing, upgrading, closing, or decommissioning, and using of existing roads and facilities can require the removal of trees. To the extent feasible, such activities with potential for disturbance shall be conducted outside the marbled murrelet breeding season. All trees removed within the RMZ or blocking a road will be left in the vicinity of their removal. See the IA, Section 3.1.1(a)(1) and (5).
- Fuel removal will be allowed only in residual and second-growth buffers and will require consultation and written concurrence from USFWS and CDFG.

- Fire suppression will be allowed as otherwise provided in a fire management plan for the MMCAs approved by the wildlife agencies within one year of the effective date of this Plan.
- Tree removal necessary for road maintenance, stormproofing, upgrading, closure, or decommissioning shall be kept to a minimum. Downed, wind-thrown, and hazard trees within the RMZ must be retained as required by the terms of the Aquatics Species Conservation Plan.
- Stream enhancement projects in the MMCAs may be undertaken with prior written concurrence of USFWS and CDFG.
- The borrow pits and rock material sources within the MMCAs may be developed and operated during the first five years of the Plan. During this five-year period, material can be used for roads, drainage, maintenance, and repair, without consultation with or concurrence from USFWS and CDFG so long as no trees greater than 12 inches dbh are removed from said locations, and no single new borrow pit area greater than 2 acres is cleared, with a maximum limit of no more than two new sites in any MMCA. A maximum of four acres may be cleared in connection with existing or new borrow pits within each MMCA for the life of the permit. Any borrow pit site tree removal or land clearance in excess of these limits from and after the effective date of this permit will require consultation with and concurrence by USFWS and CDFG and full compliance with applicable federal and state laws including NEPA and CEQA. Borrow pits are covered activities under the ITPs for a five-year period from the date the ITPs are issued. Inclusion of borrow pits as a covered activity under the ITPs after the five-year period will require an amendment to the permit.
- Scientific surveys and studies may be undertaken as part of the Plan's monitoring program.
- One of PALCO's permitted hard rock quarries, Quarry 1, Road 24, is located within the Allen Creek MMCA. The specific location, environmental setting, permit provisions, mitigations, certified environmental documentation, and approved reclamation plan for this permitted and active quarry are included in the July 1998 Draft HCP. Quarry 1/Road 24 is located in the Yager Creek drainage, approximately five miles upstream from Carlotta, California. While quarrying operations typically involve excavation, drilling, blasting, screening, loading, and related activities throughout the year, in recognition of the potential for disturbance effects upon murrelets in the Allen Creek MMCA, PALCO will limit all blasting to the period after September 15 and prior to March 24 of each year. To the maximum extent feasible, PALCO will also implement measures to mitigate disturbance impacts at other times of the year. These measures will include the CDFG recommendations for this quarry operation during the environmental review and permitting process. These measures are as follows:
 - The loading of smaller aggregate into empty trucks prior to large rock, to lessen the impact of large rock
 - The noise generated by the back gate striking the body of the dump truck should be mitigated by one of several methods: (1) pulling away from the dump site slowly, (2) padding the area between the gate and the body, or (3) removing the back gate from the body of the truck.

- The Allen Creek MMCA rock quarry is included in the permit as a covered activity under the ITPs for two years from the date of permit issuance. Inclusion of the quarry as a covered activity beyond the two-year period will require an amendment to the ITPs.

6.1.2.3 Minimization of Take of Marbled Murrelets

6.1.2.3.1 Buffer Zones

Establish 0.25 mile seasonal buffers and 300-foot buffers with PALCO's late seral silvicultural prescription (240 square-foot-per-acre conifer basal area following harvest) on PALCO lands bordering old-growth marbled murrelet habitat on public lands.

- Consultation with agencies completed on any harvest, thinning, or salvage activities
- Consultation with agencies completed on road maintenance or stormproofing
- Fuel treatments consistent with MMCA fire management plan
- Down or felled trees in MMCA retained per aquatic strategy
- Consultation with agencies completed on stream restoration projects
- Consultation with agencies completed on opening or operation of quarries and rock borrow pits
- Seasonal restriction applied within 0.25 mile of parks and reserves
- Late seral prescription applied within 300 feet of parks and reserves

6.1.2.3.2 Disturbance Minimization

The Fish and Wildlife Service, CDFG and PALCO shall review all activities proposed within MMCAs, within 0.25 mile of MMCAs, within 0.25 mile of old-growth habitat in parks and acquired reserves, and within 0.25 mile of other occupied stands to ensure that disturbance of murrelets in MMCAs has been minimized to the greatest extent feasible. Such measures may include, but will not be limited to, time-of-day restrictions, seasonal restrictions, and distance setbacks. This process will include recognition of and coordination with other HCP resource management objectives, especially aquatic protections. A checklist will be established for documentation, and it will be included with THPs and also completed for other management actions. Checklist elements will include, but will not be limited to, the following:

- Consultation with agencies completed on any harvest, thinning, or salvage activities
- Consultation with agencies completed on road maintenance or stormproofing
- Fuel treatments consistent with MMCA fire management plan
- Down or felled trees in MMCA retained per aquatic strategy
- Consultation with agencies completed on stream restoration projects
- Consultation with agencies completed on opening or operation of quarries and rock borrow pits
- Seasonal restriction applied within 0.25 mile of parks and reserves
- Late seral prescription applied within 300 feet of parks and reserves

6.1.2.3.3 Habitat Rating Evaluation Process

PALCO shall conduct a habitat rating evaluation process that applies to all stands of old-growth redwood habitat suitable for marbled murrelet nesting, including uncut old growth and residual

old growth, which are authorized for harvest, but have not been surveyed to protocol. Stands that have been determined to be occupied, or determined by protocol surveys not to be occupied, are not subject to this process.

The rating evaluation process for the residual and unentered old-growth stands described above shall include factors such as proximity to occupied stands, canopy closure, stems per acre, volume per acre, and stand size. Field measurements and onsite surveys are not required in this process. The rating process will divide those stands into two groups that are equal or nearly equal in acreage: a "higher quality" habitat group and a "lower quality" habitat group. The group with lower habitat quality rating may be harvested without other restrictions relating to murrelets, except for inclusion in the take minimization measures described in Sections 6.1.2.3.1 and 6.1.2.3.2 above. Along with the occupied stands, the group with the higher habitat rating will be subject to the take minimization processes described in Sections 6.1.2.3.1 and 6.1.2.3.2 above and Section 6.1.2.3.4 below, and in the phasing process described in Section 6.1.2.3.5 below.

6.1.2.3.4 Seasonal Restrictions

To minimize take of nesting murrelets, eggs, and young in the old-growth redwood timber stands rated as higher habitat quality in Section 6.1.2.3.3 above, and in the stands of old-growth redwood timber known and documented to be occupied by murrelets at the time of ITP issuance, and which are authorized for harvest, the following restrictions apply:

- Operations associated with falling (road construction, marking, layout construction, and falling) will occur outside the breeding season.
- Operations associated with log removal (e.g., yarding, loading, and hauling) may take place at any time, except as follows:
 - Within 0.25 mile of MMCAs or other occupied habitat (and thus subject to review under the process provided in Section 6.1.2.3.2 above)
 - As restricted by other HCP measures
 - Where restricted by other laws or regulations
 - Unsurveyed old-growth redwood stands in the lower quality habitat group are not subject to the seasonal restrictions in this section, except as provided in Sections 6.1.2.3.1 and 6.1.2.3.2

6.1.2.3.5 Prioritization and Phasing of Harvest

For old-growth and residual redwood authorized for harvest, including the higher quality habitat group rated in the process described in 6.1.2.3.3 above, conduct a prioritization process for harvest. The prioritization process and harvest phasing will not apply to the lower quality habitat group of unsurveyed habitat provided in accordance with 6.1.2.3.3 above. Overlay other constraints (e.g., inner gorge, mass wasting, etc.) to identify acreage tentatively available for harvest in the short term. To this available acreage, apply prioritization of murrelet habitat, using factors such as prior survey results, proximity to MMCAs and other occupied habitat, canopy closure, stems per acre, volume per acre, and stand size.

The USFWS, CDFG, and PALCO will work cooperatively to schedule harvest of old-growth redwood and residual old growth redwood outside the MMCAs in a manner which minimizes impacts to marbled murrelets while recognizing PALCO's operational needs. PALCO shall work cooperatively with the wildlife agencies to schedule and conduct old-growth redwood timber harvest so as to prioritize entry of the lower quality habitat group over timber stands of

the higher quality habitat group, to the extent practicable given other required constraints of the HCP and ITPs, while giving consideration to PALCO's operational needs. Constraints which overlay prioritization and must be considered include, but are not limited to, timber volumes and acreages unavailable for harvest due to mass wasting or other geologic concern, hillslope steepness or stability limitations, disturbance index, riparian management, channel migration zone, and related restrictions.

6.1.3 Monitoring

The Company will implement the implementation and effectiveness monitoring program discussed in Section 6 on the covered lands. The goals will be as follows:

1. Determine whether the HCP conservation strategies are implemented as written.
2. Determine whether the conservation strategies are having the predicted impact and effect on marbled murrelets.

These two monitoring goals can be regarded as implementation (or compliance) monitoring and effectiveness monitoring, respectively. These goals follow from the recommendations of the USFWS (Recovery Plan) and mirror similar efforts elsewhere in the region (e.g., Madsen et al. 1997, for federal lands).

Implementation and monitoring will be carried out by the wildlife agencies, in part through the HCP monitor, as described in Section 6.13. The wildlife agencies and the monitor will have full access to PALCO's land, at all times, to inspect any covered activity, and who shall be present onsite during every timber harvest conducted by or on behalf of PALCO. Implementation monitoring will also document the types, amounts, and locations of forest management activities carried out within the HCP planning area. These monitoring activities may take the form of periodic reports on landscape-level conditions assessed by using inventory and remote sensing information. For purposes of this routine compliance monitoring in which landscape changes over time are recorded. PALCO shall provide a report to USFWS and CDFG every five years, documenting (through aerial photography geographical information system [GIS] mapping, GPS reference points [where available], and other methods available and appropriate) status, changes, and trends in the MMCA areas. Items to be addressed in the report will include, but will not be limited to, the following:

- Depiction of the MMCA boundaries and indications of the location and scope of nearby harvest operations
- General description of any silvicultural activities undertaken in accordance with Section 3.1.1 of the IA with the advice and consent of USFWS and CDFG within the MMCAs and a record of the consultation, correspondence, planning, or other documentation associated with such activity
- Depiction, description, or other documentation, to the extent available, of any other consultation or correspondence between PALCO and USFWS/CDFG regarding any of the following:
 - Use, abandonment, or reclamation of permitted Rock Quarry No. 2/Road 24 located within the Allen Creek MMCA
 - Use or tree removal to facilitate borrow pit material sources within the MMCAs, as provided in this Plan

- Road use, maintenance, stormproofing, drainage repair, maintenance, or related tree removal for same as provided in this Plan
- Tree removal due to safety hazards

Effectiveness monitoring will seek to document changes in the marbled murrelet populations on PALCO lands and, to a lesser degree, on neighboring lands and waters and changes in the habitat of these populations on PALCO lands, as more particularly described below.

Effectiveness monitoring will be carried out by PALCO personnel, and/or by outside contractors, and by the wildlife agencies, in part through the HCP monitor. The program will be overseen by PALCO's existing Marbled Murrelet Scientific Review Panel (MMSRP). Members of the MMSRP will meet annually for the first five years of the plan to review monitoring program design and results and to make recommendations for future studies. All data and results will also be reported to USFWS and CDFG. Summaries of data and analyses will be presented quarterly. An annual report of all data and analyses will be presented in February/March of each year.

Prior to the design and implementation of any monitoring plan, PALCO will seek advice from statistical consultants on the most appropriate monitoring design. This advice will include explicit treatment of statistical power and the necessary effort required to determine whether effects have occurred. These preliminary studies will then be used to guide the monitoring program in consultation with the Scientific Review Panel, USFWS, and CDFG.

6.1.3.1 Conservation Objectives Guiding Monitoring Efforts

Specific objectives of the conservation program that will guide the effectiveness monitoring process include the following:

- Maintain the value of currently suitable marbled murrelet nesting habitat in the MMCAs.
- Recruit suitable marbled murrelet nesting habitat in old-growth residual stands in the MMCAs.
- Provide buffering for, and contiguity of, suitable and recruitment nesting habitat in young-growth stands within the MMCAs.
- Minimize new development or activity which could disturb murrelet nesting in MMCAs.

6.1.3.2 Research and Management Questions to be Addressed by Monitoring Efforts

Monitoring associated with the conservation objectives in this Plan is intended to respond to the following research and management questions:

- Are marbled murrelets continuing to use MMCA stands?
- What are the trends in local marbled murrelet populations?
- What are the condition and the distribution of habitat in the MMCAs and reserves?

6.1.3.3 Use of MMCA Stands

Marbled murrelet surveys have previously been carried out in the MMCAs, in the Headwaters Reserve area, and in the Humboldt Redwoods State Park. PALCO will continue to monitor

murrelets in the MMCAs to determine the continued occupancy of these stands and to gauge the levels of use in the stands. This will allow an assessment of the impact, if any, of management and conservation measures described in this Plan on the patterns of occupancy. At the same time, PALCO will cooperate with federal and state land management agencies to monitor MMCA use in the Headwaters Reserve and in the State Park. Areas within these stands will essentially serve as controls for any changes that occur in the MMCAs.

Surveys will be carried out by staff or contractors, according to the basic methods set out in the 1998 Pacific Seabird Group protocol. Results will be used to determine the number and type of murrelet detections. The overall goal of the monitoring program is to determine whether the MMCAs continue to be occupied. Essentially, the issue is whether the harvest of residual old growth and second growth outside of the MMCAs is having any detrimental effect on habitat quality within the MMCAs and, if so, to determine the relative impact of the effect on the species.

Five MMCAs will be monitored, with two survey areas in Allen Creek, and one each in Bell Lawrence, Shaw Gift, Cooper Mill, and Grizzley Creek. In addition, subject to permission and access, several control sites will be set up in the Headwaters Reserve (three areas) and in Humboldt Redwoods State Park (two areas). This constitutes a minimum of 11 survey areas, each surveyed multiple times annually. The surveys will be set up to ensure that there is adequate statistical power to compare MMCA and reserve stands. The surveys may depart from Pacific Seabird Group (PSG) protocol as needed to achieve maximum statistical power per effort.

A subsidiary goal of the survey program will be to refine existing knowledge of the relative density of murrelets in different forest stands. Such refinement may allow the use of improved metrics of marbled murrelet habitat use. Additional research or survey methods (radar, telemetry, etc.) may be used if appropriate. At this point, inland surveys are not, by themselves, thought to monitor marbled murrelet numbers effectively enough to allow estimates of population trends (Madsen et al. 1997).

6.1.3.4 Marbled Murrelet Population Trends

Estimates of marbled murrelet population sizes and trends are most effectively monitored at sea. The Northwest Forest Plan (FEMAT) effectiveness monitoring team has recently discussed the best available methods for at-sea monitoring (Madsen et al. 1997). The overall goal of that plan is to develop effectiveness monitoring for the Pacific Northwest. If murrelet populations are shown to continue to decline in the region, it is anticipated that the FEMAT implementation will be reevaluated. PALCO has long been a contributor to a cooperative effort by government and industry to facilitate at-sea survey efforts in this area. That contribution to the now decade-long monitoring program of the US Forest Service (USFS) will continue under this HCP and will supplement the proposed federal effort.

It is anticipated that off-shore monitoring will be carried out by the USFS, and/or outside contractors. PALCO will contribute \$30,000 annually to the existing cooperative research and monitoring effort for at least the first five years through the Marbled Murrelet Study Trust, or USFS, PSW Station. The MMSRP has indicated that this timeframe is necessary to detect any change in population trends. The same timeframe is also indicated by power analyses of population surveys elsewhere in California (Becker et al. 1997).

If, in the short term, population decline stabilizes, reverses, or continues at the present or lowered rates in the offshore population, this will indicate that the HCP has not adversely affected the population. If however the rate of decline increases, and such a decline is not matched elsewhere in northern California, the MMSRP will be consulted.

If offshore monitoring shows a substantial decrease in productivity from existing levels, this may suggest that the population is declining more rapidly than predicted under this HCP. The MMSRP will help interpret the available information. However, no land management adjustments are required or anticipated under this Plan pursuant to results or analyses of offshore census data.

The timing and placement of offshore surveys will inevitably be subject to varied effort, due to weather, ocean conditions, etc. To the extent practicable, PALCO will support surveys as guided by statistical power analysis and the advice of the MMSRP. PALCO will, to the extent practicable, ensure a minimum of three surveys annually on the waters offshore from the PALCO ownership.

6.1.3.5 Condition and Distribution of Habitat in MMCAs and Reserves

Multiple plots will be set up within MMCAs and MMCA buffers. These will be sampled every five years for the following attributes:

- Platform density and type
- Residuals/acre
- Status of understory
- Height
- dbh
- Species

The size, number, and distribution of vegetation plots will be determined after an initial sampling period. These data will be used to perform statistical power analysis to determine the design of subsequent sampling efforts.

6.1.3.6 Regional Marbled Murrelet Conservation Research

PALCO will establish a fund (separate from the process in 6.1.3.4 above) to conduct research regarding the conservation needs for the marbled murrelet. Funding will be applied according to recommendations of the MMSRP and the agencies, with the addition of one member of the Marbled Murrelet Recovery Team (MMRT) (USFWS, 1997). Funding may be applied to projects within marbled murrelet conservation zones 4 and 5. Funds will be provided at \$200,000 per year for the first five years and \$100,000 per year for the next five years.

6.1.3.7 Effectiveness Monitoring Annual Report and Consultation

PALCO will provide USFWS and CDFG with an annual report (annual effectiveness monitoring report or reports) detailing the following:

- The monitoring survey locations, results, data, and analyses undertaken during the past year pursuant to this Plan
- Depictions, descriptions or discussions of any purpose, planning, or design documentation related to effectiveness monitoring anticipated for the coming year

No sooner than 30 days after submitting the annual effectiveness monitoring report, PALCO shall conduct a consultation meeting with USFWS and CDFG to discuss the report and the means, methods, techniques, or adjustments in the survey effort, data analyses, or result interpretations. This consultation shall be advisory only, with the goal of refining survey or analytical efforts to achieve the objectives and to answer the research and management questions described above.

Following the consultation meeting with USFWS and CDFG, for at least the first five years of the effective term of this Plan, PALCO shall convene a meeting of the MMSRP to obtain the panel's input and advice regarding effectiveness monitoring techniques, data management, analysis and interpretation, protocols, or other related material and information. PALCO shall give USFWS and CDFG at least 30 days' advance notice of the date, time, and place it will be convening the panel, provide USFWS and CDFG access and opportunity to participate, and prepare a summary and minutes of the proceedings.

6.1.3.8 Implementation and Compliance

A PALCO THP Checklist will be used to confirm that all relevant elements of the OCP will be implemented and made enforceable under the THPs. This checklist shall be attached to each THP and will be reviewed during implementation monitoring. In addition, the HCP monitor (see Section 6.13) will be onsite on every harvest plan.

6.2 NORTHERN SPOTTED OWL CONSERVATION PLAN

This conservation strategy is a habitat-based approach. It includes the harvest, retention, and recruitment of requisite habitat types and elements within watershed assessment areas and individual activity sites. This approach will be complemented by procedures applied during covered activities to (1) minimize disturbance to northern spotted owl (NSO) activity sites, (2) monitor to determine whether these efforts maintain a high-density and productive population of NSOs on the ownership, and (3) apply adaptive management techniques when PALCO, the USFWS, CDFG, and the scientific community learn more about the biology of the NSO and/or assess how well management objectives are met. The NSO strategy will rely upon other conservation elements of the HCP for the retention and recruitment of potential foraging, roosting, and nesting habitat in watersheds across the ownership and through the HCP period. Specifically, the silvicultural requirements associated with RMZs, the mass wasting avoidance strategy, the cumulative effects/disturbance index restrictions, the MMCAs, and the retention standard of 10 percent late seral habitat for each watershed assessment area (WAA) are likely to provide habitat which NSOs may find suitable. At individual activity sites, the strategy provides specific habitat retention requirements to conserve habitat for foraging, roosting, and nesting.

The following definitions are used herein:

- **Activity site**—An activity site (or activity center) is the area including the primary roost tree of a non-nesting pair or single NSO, or the nest tree of a nesting pair. The most current NSO location shall be used to assess status. If the location is not defined by a nest tree, the primary roost tree shall be selected, based upon the area where the NSOs are most consistently located. Indicators such as regurgitated pellets, whitewash, etc., shall be used in determining the primary roost tree. The use status of the activity site must be confirmed by a daytime followup visit.

- **Pair**— Status will be determined if on two visits spaced at least one week apart before May 1, or one visit after May 1, a male and female are seen/heard within 0.25 mile of each other or (a) a male is observed taking a mouse to a female, (b) a female is observed on a nest, or (c) young are detected with an adult.
- **Nesting pair**— Status will be determined if on two visits spaced at least one week apart before May 1, or one visit after May 1, a male and female are seen/heard within 0.25 mile of each other on the same visit and any of the following occurs: (a) a female is observed on a nest, (b) either a male or female is observed delivering prey to a nest, (c) a female is observed with a brood patch (mid-April to mid-June), or (d) young are detected with an adult.
- **Reproductive rate (i.e., nesting success)**— Reproductive rate is calculated annually by dividing the total number of fledglings observed by the total number of NSO pairs monitored to determine reproductive output.
- **Suitable NSO habitat**— For purposes of characterizing foraging, roosting, and nesting. Table 6 must be used (also refer to adaptive management measure 2).

6.2.1 Management Objectives

The following are the management objectives for the NSO OCP. The methods for determining the parameters are detailed in subsequent sections.

1. Maintain a minimum of 108 activity sites each year over the life of the HCP.
2. Maintain NSO pairs on an average of 80 percent (over a five-year period) of the activity sites on the ownership.
3. Maintain an average reproductive rate of at least 0.61 fledged young per pair.
4. During the first five years of the HCP, maintain and document the minimum number of activity sites shown in Table 7.

6.2.2 Conservation Measures

1. PALCO, USFWS, and CDFG shall establish an NSO Scientific Review Panel (NSOSRP), in the same manner as identified for the Grizzley Creek Panel in 3.1.2 of the IA. This panel shall review and make recommendations for monitoring techniques, offer expert review of monitoring results, and make recommendations to PALCO on habitat retention standards for maintenance and recruitment of NSO activity sites. This same panel shall provide expert review and recommendations for implementation of the marbled murrelet conservation measures. This panel shall be convened, at a minimum, in years 1, 6, and 11 following issuance of the ITP.
2. PALCO shall conduct complete annual censuses to monitor all activity sites on the ownership and to determine numbers of pairs, nesting pairs, and reproductive rates. PALCO may use a sampling methodology, rather than a complete census, provided that the sampling proposal has been reviewed by the NSOSRP and approved by USFWS and CDFG. Monitoring data shall be provided annually to the NSOSRP, the USFWS, and CDFG.
3. Surveys

- For active operations which are initiated prior to the onset of the breeding season (March 1), the THP area and a 1,000-foot buffer will be surveyed, with one visit between March 1 and March 15, or later if necessary. Two additional surveys, at least one week apart will be performed between March 15 and August 31.
- For new operations initiated between March 1 and August 31, the THP area and a 1,000-foot buffer shall be surveyed. Three survey visits, each separated by at least one week, shall occur prior to the start of operations, but after March 1.

Table 6. Wildlife Habitat Relationship (WHR) Habitat Type and Use by Northern Spotted Owls

WHR	3P	3M	3D	4S	4P	4M	4D	5S	5P	5M	5D	6
MHW		LF	LF	LF	MF	LR	MR	HF	LR	HN	HN	HN
MHC		LF	LF	LF	MF	LR	LR	HF	LR	MN	HN	HN
DFR	LF	MF	HF	LF	MF	MR	MN	MF	LR	HN	HN	HN
RWD	LF	MF	MF	LF	LF	LR	MN	HF	LN	MN	HN	HN

Use: L = low; M = medium; H = high; F = foraging; R = roosting; N = nesting; MHW = montane hardwood; MHC = montane hardwood-conifer; DFR = Douglas-fir; RWD = Redwood
 Size Class—3 = poletree 6 to 11 inches dbh; 4 = small tree 11 to 24 inches dbh; 5 = medium/large tree more than 24 inches dbh; 6 = multi-layered habitat
 Canopy Closure—D = dense cover 60 to 100%, M = moderate cover 40 to 59%, P = open cover 25 to 39%

Table 7. Management Thresholds for Northern Spotted Owl Activity Sites

Years After Permit Issuance	Minimum Number of Activity Sites
1	145
2	135
3	125
4	115
5+	108

- When NSOs are contacted on the surveys, a daytime followup will be conducted as soon as possible to determine nesting status (also see the definition of nesting pair). If NSOs are detected within areas where management activities will occur, operations shall cease until status is determined.
 - Once nesting status has been determined, the following three conservation measures (4, 5, and 6) shall be implemented.
4. Before June 1 each year, PALCO shall select and identify to USFWS and CDFG at least 80 activity sites which shall be maintained using the following habitat retention guidelines (referred to as Level One habitat retention). Activity sites selected for Level One habitat retention must have supported NSOs in the previous

year and must also be active for the year in which the site is selected. PALCO may select any 80 activity sites which meet Level One habitat retention standards. Selection of a site in one year does not imply that the site must be maintained in subsequent years.

- For activity sites where the NSO status has been determined to be nesting, or until a wildlife biologist determines that nesting has failed, or that young can avoid direct impacts of timber harvest (e.g., young are capable of sustained flight or can take live prey independently), no harvesting shall occur during the breeding season (March 1 through August 31) within a 1,000-foot radius of the nest tree.
 - The characteristics of suitable nesting habitat, if present, must be maintained within 500 feet of the activity center. No timber operations, including salvage, shall be conducted in this area during the breeding season unless approved by the USFWS and CDFG. Timber operations may be conducted in this area outside the breeding season if appropriate measures are adopted to protect suitable nesting habitat.
 - Within 500 to 1,000 feet of the activity center, sufficient suitable characteristics, if present, must be retained to support roosting and to provide protection from predation and storms.
 - Five-hundred acres of suitable NSO habitat must be provided, if present, within 0.7 mile of the activity center. Less than 50 percent of the retained habitat shall be under operation in any one year. If less than 500 acres of suitable NSO habitat is present, the acreage shall not be reduced. The 500 acres includes the habitat retained in the first two hyphenated items above and should be as contiguous as possible.
 - On thousand thirty-six total acres of suitable NSO habitat must be provided, if present, within 1.3 miles of each activity site. If less than 1,336 acres of suitable NSO habitat is present, the acreage shall not be reduced.
 - The shape of the areas established for habitat retention objectives shall be adjusted to conform to natural landscape attributes such as draws and stream courses, while retaining the total area required.
5. At activity sites which have not been designated for Level One protection, PALCO shall apply Level Two protection measures as follows:
- For activity sites where the NSO status has been determined to be nesting; or until a wildlife biologist determines that nesting has failed, or that young are capable of avoiding direct impacts of timber harvest (e.g., young are capable of sustained flight or can take prey independently), no harvesting shall occur during the breeding season (March 1 through August 31) within a 1,000-foot radius of the nest tree.
 - Following the breeding season, 18 acres around the activity site shall be maintained as suitable nesting habitat, if present. The protected 18 acres shall conform to natural landscape features, as designated by PALCO's wildlife biologist, and the buffer protecting the activity site must be at least 400 feet wide.
 - For activity sites which have been determined to be occupied by a non-nesting pair or single NSO, 18 acres around the activity site shall be

maintained as suitable nesting habitat, if present. The protected 18 acres shall conform to natural landscape features, as designated by PALCO's wildlife biologist, and the buffer protecting the activity site must be at least 400 feet wide. At PALCO's discretion harvesting may occur during the breeding season, in the area adjoining the 18-acre habitat retention area.

6. Activity sites which are not needed to meet management objectives 1 or 4 shall receive a 1,000-foot buffer during the breeding season. Timber associated with these activity sites may be harvested before March 1 or after August 31. All nest trees shall be marked by PALCO's wildlife biologist and shall be retained if the activity site is harvested.

6.2.3 Adaptive Management

1. PALCO is encouraged to conduct research to identify alternative activity site retention models for long-term management through the permit period. After five years, or at any later date during the permit period, PALCO may present alternative activity site retention models for review by the NSOSRP to substitute for conservation measures 4 and 5. Alternative activity site retention models shall not be implemented until they have been reviewed and approved by the USFWS and CDFG. PALCO may use these models to manage for recruitment of suitable habitat and potential establishment of new activity sites.
2. PALCO, USFWS, or CDFG may at any time propose modifications to the characterizations of NSO suitable habitat provided in the definition of suitable NSO habitat on page P-21 (Table 6). Proposals shall be validated against any relevant data including that collected in the performance of conservation measure 2. The NSOSRP shall review applicable information and provide a recommendation to PALCO, USFWS, and CDFG who shall mutually agree upon any modifications.
3. Management objectives may be modified if new information becomes available following review of the NSOSRP recommendations and approval by USFWS and CDFG.
4. The seasonal bounds and duration of the prohibition on harvesting adjacent to activity sites may be modified based upon specific ownership information provided at PALCO's discretion upon review by the NSOSRP and approval by USFWS and CDFG.
5. The actual or estimated number of activity sites shall remain at or above management objectives 1 and 4 (Table 7) for each year of the HCP. If the applicable management objective is not achieved for any year of Plan operations, or if, for any reason PALCO is unable to accomplish conservation measure 4, PALCO shall convene the NSOSRP for a joint meeting with USFWS and CDFG to review potential reasons why the objectives are not being met and implement no-take management procedures. No-take management shall be implemented until the specific management objective or conservation measure is achieved.
6. Proportions of activity sites occupied by pairs and reproductive rates shall be averaged over running five-year periods. If the five-year average for either parameter does not meet the management objective, PALCO shall convene the NSOSRP for a joint meeting with USFWS and CDFG to review potential reasons

why the objectives are not being met and to determine potential corrective measures to implement. Following this consultation, PALCO, USFWS, and CDFG shall jointly develop modifications for the conservation measures in Section 6.2.2. Any modifications shall be consistent with issuance criteria for (10(a)(1)(B) of the FESA and the CESA.

7. Management objective 1 and conservation measure 4 may be modified commensurate with changes in ownership size following review by the NSOSRP and approval by USFWS and CDFG. Modifications based upon ownership size and the scope of incidental take coverage extended by USFWS and CDFG may be proposed either by PALCO or the wildlife agencies.

6.3 AQUATICS CONSERVATION PLAN

6.3.1 Management Objective

The goal of the aquatics conservation plan is to maintain or achieve, over time, a properly functioning aquatic habitat condition. This condition, as defined by NMFS, is essential for the long-term survival of anadromous salmonids and is identified in a matrix with habitat variables necessary to achieve this goal. Not all variables will be attainable over the life of the Plan, regardless of PALCO's effort. Specifically, this includes the recruitment of large wood onto the forest floor and into the watercourses. For this reason, and because habitat conditions are not static, the specific habitat variables are not enforceable standards under the Plan. The attainment of the conservation goal is the cornerstone of the entire Aquatics Conservation Plan.

The key variables are water temperature, canopy cover, sediment, instream large wood, large wood recruitment, pool frequency, and pool quality. Refer to the July 1998 Draft HCP, Volume IV, Part D, Section 6, for the quantitative and qualitative targets for each variable and to Table 8 for a summary.

Table 8. Projected Forest Seral Types in Class I WLPZs by Decade for the Plan Period (acres)

Seral Type	Decade												
	0	1	2	3	4	5	6	7	8	9	10	11	12
Non-timber	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018
Prairie	96	96	96	96	96	96	96	96	96	96	96	96	96
Forest Opening	294	1	1	1	1	1	1	32	5	13	1	1	1
Hardwood	230	147	31	17	57	57	60	58	60	172	187	202	200
Young Forest	1,375	1,858	1,225	399	124	60	103	70	259	272	80	19	9
Mid-successional	4,433	4,503	4,983	5,750	5,451	5,240	4,390	3,359	2,417	2,384	2,100	2,167	2,434
Late Seral	3,133	3,064	3,435	3,520	4,069	4,355	5,158	6,194	6,972	6,871	7,344	7,324	7,069
Old Growth	505	398	296	285	268	258	258	258	258	258	258	258	258
Total	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085	11,085

6.3.2 Watershed Analysis

6.3.2.1 Process

1. Watershed analysis is required for all covered lands in the HCP.
2. Within 60 days of the effective date, PALCO, in consultation with the wildlife agencies, shall establish a schedule that results in completion of the initial watershed analysis processes for all covered lands within five years of the issuance of the ITP.
3. A modified version of the *Washington Forest Practices Board Manual: Standard Methodology for Conducting Watershed Analysis - Version 4.0*, November 1997 (WDNR methodology) process or a modified version of the most current WDNR methodology shall be used. The process shall include an assessment, synthesis (with a cumulative effects assessment), prescription development, monitoring, and revisitation.
4. Variations on the methodology and modules will be approved by NMFS and USFWS, in consultation with state agencies. PALCO may also recommend variations.
5. The assessment modules from the WDNR methodology that will be used, in a modified format, include mass wasting, surface erosion, riparian function, fish habitat, and stream channel assessment. The Pacific Watershed Associates (PWA) sediment source assessment methodology (July 1998 Draft HCP, Volume II, Part O, with Attachments), with additions for non-road-related surface erosion, may be used in place of the surface erosion module. Water quality critical and key questions may also be incorporated into the assessment.
6. Key and critical (as used in the WDNR methodology) questions for use in the modules will be customized for HCP covered species and PALCO's ownership.
7. A distinct cumulative effects assessment is a required variation of the watershed analysis process. The new process used during watershed analysis shall include, but is not limited to, the information which has been developed as part of the disturbance index assessments done prior to completion of the watershed analysis.
8. An amphibian and reptile assessment module shall be developed which includes key and critical questions regarding life history requirements, including those upslope of the RMZ boundaries. This module will be used as part of every watershed analysis. Results from this module shall be integrated into synthesis and prescription development to minimize and mitigate management effects on all phases of life history.
9. The area analyzed shall be watershed(s) of approximately 10,000 to 50,000 acres, as delineated by the wildlife agencies and PALCO, and approved by the wildlife agencies. These analysis areas will be similar to the size of several planning watersheds or single hydrologic unit.
10. The entire watersheds/analysis areas where PALCO owns all or portions of the land will be assessed. A Level 2 assessment (as described by the WDNR methodology) is required for all lands PALCO owns in specified watersheds/analysis areas at the

time of the analysis. A Level 1 assessment is required for lands not owned by PALCO at the time of the analysis.

11. The analysis will be performed by an interdisciplinary team of qualified scientists and technical staff.
12. At least one representative from PALCO and each of the wildlife agencies will serve on the analysis teams. If available, a representative from the U.S. Environmental Protection Agency (EPA) and the California Department of Conservation will also serve on the analysis teams. The North Coast Regional Water Quality Control Board and CDF may also participate on the teams.
13. The wildlife agencies shall review each watershed analysis upon its completion.
14. Timelines for completion of the individual components according to the WDNR methodology are not required. However, timelines for completion of these various components of the analysis will be developed based on mutual agreement between PALCO and the wildlife agencies on an individual watershed analysis basis.
15. The watershed analysis process shall be open for public comment. PALCO will present the public with an account of what the company will be doing with respect to each watershed analysis. The goal of this interaction is to obtain public input on problems and priorities. Members of the public who have been technically trained may also participate in the technical analysis. On completion of each watershed analysis, PALCO will also present the results of the watershed analysis and justifications of methodologies and prescriptions.

6.3.2.2 Post-watershed Analysis Prescriptions

1. Site-specific prescriptions resulting from a watershed analysis must always be designed to achieve, over time, or maintain a properly functioning aquatic habitat condition (i.e., essential habitat elements), as defined by NMFS consistent with the limitations described in Section 6.3.1.
2. Watershed analysis may modify the following elements of the Aquatics Conservation Plan: hillslope management prescriptions; channel migration zone prescriptions; Class I, Class II, and Class III RMZ prescriptions; the disturbance index; and monitoring.
3. The wildlife agencies shall establish the site-specific prescriptions for implementation upon the completion of each watershed analysis.
4. PALCO shall implement the site-specific prescriptions established by the wildlife agencies.
5. If the wildlife agencies establish site-specific prescriptions that differ from prescriptions proposed in the watershed analysis, the agency shall state its reasons for doing so in writing.
6. The maximum and minimum limits for post-analysis prescriptions, as described below, set forth the range in which prescriptions may be modified for the Class I and II RMZs.

7. The post-analysis, minimum RMZ limits include the following:
 - RMZ prescriptions for both Class I and II waters shall be no less than 30-foot, no-harvest zones (slope measurements) on each side of the waters.
 - The Class II RMZ minimum 30-foot, no-harvest zone (slope measurement) may be adjusted to a minimum 10 foot, no-harvest zone if NMFS or USFWS determines that this adjustment will benefit aquatic habitat or species.
 - For Class I RMZs, if the initial watershed analysis or subsequent revisitations allows for harvest entry into the 30- to 100-foot zone, then the 18 largest conifer trees per acre shall be retained on each side of the waters per each harvest entry (i.e., the largest 18 trees preharvest shall be retained at the end of each harvest). The largest trees per acre in the minimum 30-foot, no-harvest zone can be counted towards the total 18 trees per acre. If larger trees exist in the 100- to 170-foot zone than in the 0- to 100-foot zone, then trees in the 100- to 170-foot zone shall make up all or a portion of the 18 large trees per acre on each side of the waters for that specific entry.
 - For the Class I and II RMZs, exclusive of the 18 largest trees per acre on each side of the waters, any additional trees left for retention shall include those with the highest probability of recruitment to waters.
 - FPRs in effect at the time of post-watershed analysis prescription development apply to all other areas. At no time shall the prescriptions be less than those required under the FPRs.
8. The post-analysis maximum RMZ limits include the following:
 - RMZ prescriptions for Class I and II waters shall be no-harvest zones that do not exceed 170 feet (horizontal measurement) on each side of the waters.
 - The RMZ minimum and maximum limits, as described above, will be taken into consideration during synthesis and prescription development.
9. The habitat requirements and HCP minimization and mitigation measures for the red tree vole, NSO, Pacific fisher, and other affected terrestrial covered species shall be taken into consideration during synthesis and prescription development. Proposed post-watershed analysis prescriptions with the potential to negatively impact habitat or minimization and mitigation measures for these species shall be reviewed to ensure that such prescriptions are consistent with the management objective(s) and conservation measures identified in the specific conservation plan for each such species.
10. Prescriptions developed as a result of watershed analysis cannot be extrapolated to other watersheds.

6.3.2.3 Peer Review, Monitoring, and Revisitation

1. NMFS and USFWS, in consultation with CDF, the North Coast Regional Water Quality Control Board (NCRWQCB) and CDFG, shall establish a peer review process to evaluate, on a spot-check basis, the appropriateness of completed analysis and prescriptions that are developed through the watershed analysis process prior to the completion of the first watershed analysis. See Section 3.3.3.1(j) of the IA.
2. A peer review in accordance with the process established in Section 3.1.3.1(a) through (f) and (k) of the IA may be requested if any PALCO or wildlife agency member of the watershed analysis team disagrees with one or more of the prescriptions recommended by the analysis team.

3. Monitoring objectives and hypotheses will be derived from the watershed analysis to assess the effectiveness of prescriptions and trends in achieving a properly functioning aquatic habitat condition. Refer to aquatics effectiveness and trend monitoring Sections 6.3.5.2 and 6.3.5.3.
4. PALCO and the wildlife agencies will review completed watershed analyses at five-year intervals to determine whether prescriptions are adequate. This review includes, but is not limited to, determinations as to whether new science has developed that might influence prescriptions, the response of the watershed to prescriptions already implemented (monitoring), and whether watershed conditions have changed. The results may include revision of the prescriptions as part of adaptive management or conducting additional analyses which may also trigger prescription modifications.
5. Any proposed prescription modification(s) resulting from a revisitation shall be subject to the same process as the initial analysis. This process includes NMFS and USFWS establishment of prescriptions to be implemented, maximum and minimum limits, peer review, etc.
6. Additional terms regarding watershed analysis are contained in the IA, Section 3.1.3.1.

6.3.3 Control of Sediment from Roads and Other Sources

6.3.3.1 Sediment Assessment

1. PALCO will assess the existing road network and associated sediment sources on its lands either within five years as part of watershed analysis or within five years of the planned stormproofing. Inventories will be updated within five years of the actual stormproofing. The road assessments will be conducted according to Pacific Watershed Associates protocols (July 1998 Draft HCP, Volume II, Part O, with Attachments). The assessments must be completed in the following order:
 - Elk River, Freshwater Creek, Lawrence Creek, Yager Creek (including Lower, North Fork, Middle, and South Fork), Van Duzen River, Middle Fork Eel River, Larabee/Sequoia Creek, Mattole River, Salmon Creek, Bear River.
2. Adjustments to the priority list above shall be made in consultation with the wildlife agencies.
3. All high and medium priority sites will be stormproofed within five years of completion of the assessments, and all stormproofing will be completed within 20 years of the effective date.

6.3.3.2 Road/Landing Stormproofing

Roads and landings will be stormproofed to the standards identified in Weaver and Hagans (1994) within the first 20 years of the Plan, at a minimum rate of 750 miles per decade and 75 miles per year. Stormproofing conducted as part of THPs will count towards the yearly and per-decade totals. Stormproofing completed to the standards identified in Weaver and Hagans (1994) prior to issuance of the ITP will also count towards the first decade totals. Roads and landings that are closed or decommissioned according to the standards in Weaver and Hagans (1994) are also considered stormproofed and can be counted towards the yearly and per-decade

totals. When used in this Plan, the term stormproofing describes a process which involves the following elements:

1. The assessments follow the Pacific Watershed Associates protocols (July 1998 Draft HCP, Volume II, Part O, with Attachments). Generally, a trained observer walks a road segment looking for actual or potential occurrences of erosion, slippage, mass wasting, blocked or perched culverts, or other sediment sources. The assessment documents instances of Humboldt crossings, unstable fill slopes for roads and landings, water crossings that have a moderate to high potential for culvert blockage and/or diversion of stream flows onto the road bed, sufficient drainage, and diversions of road drainage directly into the waters.
2. The likelihood that each identified feature will deliver sediment to waters is also evaluated as part of the road and landing assessment, as is total volume of sediment that could be prevented from delivery whether or not remedial action is taken.
3. Based on the volume of sediment saved and likelihood of delivery, sites are assigned a high, medium, or low priority.
4. All high- and medium-priority sites are scheduled for corrective action. Corrective action typically requires an excavator, bulldozer, and one or more dump trucks to dig up and replace water crossings, install drainage structures, remove unstable fill, alter the road bed to reduce the potential for diversion of flows onto the road surface, and install rolling dips and/or water bars to route water and sediment.
5. All high- and medium-priority sites will be stormproofed within five years of completion of the assessments, with all stormproofing completed within 20 years of the issuance of the ITP.
6. Stormproofing will be completed on 750 miles within the first decade and 750 miles in the second decade. At least 75 miles of existing roads and landings will be stormproofed per year. PALCO can request that NMFS grant an exemption in writing from the 75 miles per year requirement based on lack of work time due to atypical summer wet weather patterns or the repair of an unusually high number of water crossings. Such an exemption will be granted on showing of good cause.
7. To the extent feasible given logistics and the cost of moving equipment, PALCO will stormproof the worst sites, i.e., those most likely to fail or deliver the greatest volume of sediment to waters, in the first 10-year period. In addition, the very highest priority sites, i.e., those at risk of imminent failure which would deliver significant amount of sediment to waters, will be stormproofed in the first three years.
8. Stormproofing shall be conducted between May 2 and October 14, subject to the following standards (these standards are the same for road construction/reconstruction/upgrade standards between June 2 and October 14):
 - From May 2 to October 14, road and landing stormproofing shall not occur during periods of rainfall of 0.25 inch or greater during a 24-hour period or less. Operations shall cease and not resume until and unless soil moisture conditions, in soil moved for the purposes of construction and reconstruction, are no wetter than is found during normal watering (dust abatement)

treatments or light rainfall, and the soil is not rutting or pumping fines. Operations shall not result in a visible increase in turbidity in any drainage facility, on any construction/reconstruction site, or on any road and landing surface, any of which drains directly to Class I, II, or III waters. Standing water on the road or landing which does not drain to Class I, II, or III waters is not applicable.

9. Stormproofing shall cease during the period between October 15 and May 1 (note the May 1 end-date differs from the road construction/reconstruction end-date of June 1), except for the following:
 - After October 15, specific stormproofing treatments, listed below, can continue until the first storm of 0.25 inch or greater in a 24-hour period or less. The stormproofing treatments permitted during this period are as follows:
 - Installing rolling dips and water bars
 - Armoring culvert inlets and outlets
 - Armoring unstable road fill
 - Rocking road and landing surfaces
 - After the first storm as defined above, all stormproofing treatments shall comply with the road construction/reconstruction/upgrading wet-weather-period standards until May 1. After May 1, Section 6.3.3.2, number 8 applies.
10. Road and landing fill and actively eroding slopes that can be demonstrated as being at high risk of immediate failure and which may deliver sediment to waters can be treated between October 15 and May 1.
11. Stormproofing is considered complete when the specified corrective actions are complete, and the roads database and GIS system are updated to show that the subject road and landing have been stormproofed. The roads database will display where the treatments occurred, their extent (e.g., the milepost), and the type of treatment.
12. Refueling of equipment and vehicles will be done outside of the RMZs and stream crossings. Adding, draining, or depositing lubricants, coolants, or hydraulic fluids will be done outside of the RMZs and stream crossings.

6.3.3.3 Road Construction, Reconstruction, and Upgrades

1. For purposes of this Plan, a road will be considered upgraded when it is well drained and shows no signs of imminent failure (e.g., as evidenced by slumping scarps or cracks in the road fill) which would deliver sediment to waters. Actions necessary to upgrade a road include the installation of ditch relief culverts and/or rolling dips where significant downcutting of the ditch is noted and removal or stabilization of unstable fill material at sites showing signs of imminent failure which could impact waters. An upgraded road, as described above, meets the definition used in the Plan of "complying with the specifications described in the *Handbook for Forest and Ranch Roads* (Weaver and Hagans, 1994.)"

Road upgrades differ from road stormproofing in that upgrades are not required on a specified schedule, are not necessarily identified through a sediment sources

assessment, are not tracked on a database, and may not be as extensive as stormproofing.

2. All THP-related roads and landings shall be upgraded, as defined above, or closed or decommissioned, as per Weaver and Hagans (1994). THP-related roads and landings are defined as those within the THP boundary and appurtenant to the THP area within the planning watershed(s) where the THP occurs. This road upgrading and closure shall result in sufficient sediment reduction in the planning watershed(s) to offset sediment production from the THP. The sediment reduction requirement remains in effect until a completed watershed analysis indicates that sediment is no longer causing an adverse impact to the aquatic environment.
3. All new and reconstructed roads will be built to site-specific stormproof specifications, as described by Weaver and Hagans (1994).
4. For all new roads and reconstructed water crossings, structures over fish-bearing and restorable fish-bearing waters will be designed to provide for unimpeded fish passage. This could involve use of bottomless or baffled culverts, bridges, or other such structures. Where culverts are used, they will be installed at an appropriate gradient, be sized to permit passage of a 100-year recurrence interval flood without overtopping the culvert, and shall maintain a stream bed to ensure that the culverts are passable for fish and to prevent culvert "perching." Fish passage will be ensured by adhering to standards for culvert installation developed by NMFS, or by NMFS review and approval of alternate installation measures.
5. Roads shall be constructed or reconstructed as single-lane with periodic turnouts. Roads shall be no more than 12 to 14 feet wide. Periodic turnouts, combined with road width, may extend out to a total of 18 feet.
6. New and reconstructed roads and landings shall be located outside RMZs except for RMZ crossings, which shall be minimized.
7. Roads shall be constructed or reconstructed by outsloping and maintained with rolling dips or ditched roads with well-spaced ditch relief systems.
8. Road drainage structures and facilities shall be spaced at appropriate intervals such that surface flow originating from the road surface and ditch does not create a gully or sediment plume that connects with the channel network.
9. Roads which utilize an inside ditch shall have ditch relief culverts spaced at intervals no greater than those specified in Weaver and Hagans (1994).
10. New, reconstructed, and upgraded road-water crossings shall be constructed such that they do not have the potential to divert flows down the road or inside the ditch.
11. No roads or landings will be constructed or reconstructed across inner gorges, headwall swales, unstable areas, or areas having a high, very high, or extreme mass-wasting hazard rating, except as approved following the mass-wasting avoidance strategy. Refer to the mass-wasting avoidance strategy for road standards pre- and post-watershed analysis.

12. Road or landing construction, reconstruction, and upgrades shall not occur during the wet weather period, defined for this purpose as October 15 to June 1, unless the following conditions are met:
 - No road or landing construction, reconstruction, and upgrading within 170 feet of Class I or II waters, or within the EEZ (50 or 100 feet, respectively) of Class III waters.
 - The construction, reconstruction and upgrading shall not/will not cross Class I, II, or III waters.
 - No portion of the constructed, reconstructed, and upgraded road/landing shall cross an inner gorge, headwall swale, unstable area, extreme, very high, or high mass-wasting hazard area.
 - The soil moisture condition in the soils moved for purposes of construction, reconstruction, and upgrading shall be no wetter than is found during normal watering (dust abatement) treatments or light rainfall, and the soil is not rutting or pumping fines.
 - During and after construction, reconstruction, and upgrading, there shall be no visible increase in turbidity in any drainage facility, construction/reconstruction site, or road surface, any of which drains directly to Class I, II, or III waters (standing water on the road that does not drain to Class I, II, or III waters is not applicable).
 - During construction, reconstruction, and upgrading, erosion control material of sufficient quantity shall be stockpiled onsite and utilized to prevent an increase in turbidity in any drainage facility, construction/reconstruction site, or road surface, any of which drains directly to Class I, II, or III waters.
13. From June 2 to October 14 (the period outside of the wet weather period), road or landing construction, reconstruction, and upgrades shall not occur during periods of rainfall of 0.25 inch or greater during a 24-hour period or less. Operations shall cease and not resume until and unless soil moisture conditions, in soil moved for the purposes of construction and reconstruction, are no wetter than is found during normal watering (dust abatement) treatments or light rainfall, and the soil is not rutting or pumping fines. Operations shall not result in a visible increase in turbidity in any drainage facility, on any construction/reconstruction site, or road surface, any of which drain directly to Class I, II, or III waters. Standing water on the road which does not drain to Class I, II, or III waters is not applicable.
14. Road fill and actively eroding slopes that can be demonstrated as at high risk of immediate failure which may deliver sediment to waters can be upgraded between October 15 and June 1.
15. A federal permit violation has not occurred if an activity that results in an unavoidable input of sediment to waters occurs, even though all wet weather and construction/reconstruction requirements were properly followed, in addition to all required erosion control measures being properly installed. This does not relieve PALCO of any other requirements under other applicable federal and state laws.
16. Refueling of equipment and vehicles will be done outside of the RMZs and stream crossings. Adding, draining, or depositing lubricants, coolants, or hydraulic fluids will be done outside of the RMZs and stream crossings.

6.3.3.4 Road Maintenance

1. Permanent roads through RMZs shall be treated and maintained with rock, chip seal, or pavement. This includes water crossings and approaches.
2. Proper surface drainage configuration of the road (e.g., outsloping) will be maintained during maintenance activities.
3. Inboard ditches will be maintained (e.g., blading) only where blockage or insufficient capacity occurs.
4. Routine corrective work that will prevent diversion of water from a watercourse or ditch (e.g., repair to inside ditches, cross drains, water bars, road surface, unblocking of culverts, etc.) will be performed as soon as conditions permit, consistent with federal and state law, regardless of the time of year.
5. Maintenance needs, other than those stated in number 4 above, identified between June 1 and October 15 will be performed prior to October 15. Maintenance needs, other than those stated in number 4 above, identified after October 15 and prior to June 1 will be performed after June 1.
6. Refueling of equipment and vehicles will be done outside of the RMZs and stream crossings. Adding draining or depositing lubricants, coolants, or hydraulic fluids will be done outside of the RMZs and stream crossings.

6.3.3.5 Road Inspections

1. All THP roads, including drainage facilities and landings, shall be inspected annually for five years after operations, at a minimum.
2. All roads shall be inspected at least once annually after June 1 and prior to October 15 to ensure that drainage structures and facilities are in proper condition. This includes all improperly abandoned roads according to the definition provided by Weaver and Hagans (1994).
3. All roads shall be inspected again at least once during January or February, as soon as conditions permit access, following a storm event of 3 inches or greater in a 24-hour period or less. Multiple inspections during the winter period (October 15 to May 1) are encouraged, but only one inspection is required during January or February.
4. Roads and landings that cannot be inspected during any one of the annual inspections after June 1 and before October 15 must be closed or decommissioned according to guidelines provided by Weaver and Hagans (1994). This work must be conducted within the same timelines as the stormproofing.
5. Closed and decommissioned roads will be inspected after the first five-year storm event or five years after completion of work, whichever comes first, to ensure that treatments to restore natural drainage and hillslope stability are functioning as intended. If treatments are found to be ineffective, further treatments shall occur if the volume of sediment prevented from entering a channel by additional treatments is greater than that incurred by re-entering the site.

6. Annual logs documenting inspection efforts will be provided to the wildlife agencies and CDF on the same schedule as the monitoring reports.

6.3.3.6 Wet Weather Road Use Restrictions

1. All road use is permitted when the road is dry; see the definition below.
2. Except as provided below, all use of non-paved roads shall cease during periods when precipitation is sufficient to generate overland flow off the road or when it is capable of leaving the road. Once road use has ceased due to the foregoing conditions, use shall not resume until and unless the road surface is dry. A dry road is one in which moisture is less than or equal to that found during normal watering (dust abatement) treatments or light rain, and soil is not rutting or pumping fines causing a visible increase in turbidity in a drainage facility or road surface, any of which drains directly to Class I, II, or III waters. This provision shall be applied according to a rule of reasonableness, and it shall not prohibit, for example, use of a small segment of wet road on an otherwise dry road. If any permitted use results in damage to the road surface, drainage facilities, water bars, or stream crossings, the damage will be repaired within 24 hours after it occurs to eliminate the likelihood of related sediment reaching Class I, II, or III waters.
3. Consistent with federal and state law and regulation, in order to prevent or minimize significant adverse effects to the aquatic resource, emergency access is allowed during periods of wet weather in order to correct emergency, road-related problems in the form of blocked culverts, imminent road fill failure, other erosion problems, and emergency human safety situations.
4. On rocked roads, light vehicles (defined as trucks 3/4 ton or less, or smaller vehicles such as quadra-tracs or motorcycles) may be used during periods of wet weather. If the use of rocked roads results in road-related damage to the road surface, drainage facilities, water bars, or water crossings, the damage will be repaired using hand tools within 24 hours after the initial damage has occurred to eliminate the likelihood of related sediment reaching Class I, II, or III waters.
5. On non-rocked roads, light vehicles (defined as trucks 3/4-ton or less, or smaller vehicles such as quadra-tracs or motorcycles) may be used during periods of wet weather only for the purposes of wildlife, fisheries, and plant surveys; HCP Monitor activities; agency inspections; and erosion inspections. If this use of non-rocked roads results in road-related damage to the road surface, drainage facilities, water bars, or water crossings, the damage will be repaired using hand tools within 24 hours after the initial damage has occurred to eliminate the likelihood of related sediment reaching Class I, II, or III waters. Damage should not be to such extent that heavy equipment would be required for repairs.
6. On non-rocked roads, light vehicles (defined as trucks 3/4-ton or less, or smaller vehicles such as quadra-tracs or motorcycles) may be used during periods of wet weather 48 hours after the end of precipitation for the purposes of timber related operations including reforestation, felling, and bucking, and research and monitoring. Any damage light vehicle use causes to the road surface, drainage facilities, water bars, or water crossings will be repaired using hand tools within 24 hours after the initial damage has occurred to eliminate the likelihood of related

sediment reaching Class I, II, or III waters. Damage should not be to such extent that heavy equipment would be required for repairs.

6.3.3.7 Hillslope Management

The hillslope management mass-wasting strategy applies to all portions of PALCO's ownership, including the RMZs. The prescriptions in the RMZs for mass wasting will not be less restrictive than the riparian prescription developed as part of watershed analysis, as appropriate and applicable to this Plan. The hillslope management prescriptions may be modified as a result of watershed analysis.

1. PALCO shall not harvest, including sanitation salvage, exemption harvest, and emergency timber operations, on mass-wasting areas of concern defined as areas of extreme mass-wasting hazard, very high mass-wasting hazard, high mass-wasting hazard, inner gorges, headwall swales, and unstable areas, including those within the RMZs on Class I, II, and III waters. This restriction may be modified as a result of watershed analysis.
2. Except as described below, PALCO will not construct or reconstruct roads across mass-wasting areas of concern defined as areas of extreme mass-wasting hazard, very high mass-wasting hazard, high mass-wasting hazard, inner gorges, headwall swales and unstable areas, prior to watershed analysis.
 - Newly constructed and reconstructed roads (not including stormproofing) on mass-wasting areas of concern (defined above) may be permitted prior to watershed analysis if PALCO provides the following:
 - A map of the mass-wasting areas of concern overlaid by all existing roads and all proposed new construction and reconstruction on a planning watershed scale for a one-year timeframe or longer
 - A geologic analysis of the risk of hillslope failure by the proposed new construction and reconstruction
 - All the information will be provided to the wildlife agencies who will make a determination if all, some, or none of the proposed road construction or reconstruction will be permitted across the mass-wasting areas of concern. This determination will be based on the proposed road locations, road specifications, and the likelihood of avoidance of significant adverse impacts to covered species. The wildlife agencies will work cooperatively to provide consistent determinations to PALCO within 60 days after receipt of the maps and geologic reports as described above. If any of the wildlife agencies determines that the proposed road construction/reconstruction will not be permitted, that agency will work cooperatively with PALCO and the other wildlife agencies to develop feasible alternative road locations and/or road specifications or other access methods that will avoid significant impacts to covered species.
3. After watershed analysis, roads may be constructed or reconstructed across inner gorges, unstable areas, headwall swales, or areas having a high, very high, or extreme mass-wasting hazard rating if the watershed analysis indicates that roads across these areas are appropriate. This watershed analysis determination shall include, but is not limited to, an assessment of risk to the aquatic environment by qualified wildlife agency aquatic biologist(s) or aquatic biologists acceptable to the

wildlife agencies. If the watershed analysis indicates that roads in these areas are appropriate, the proposed roads and road specifications shall be evaluated, at the time of road design, by qualified professional geologist(s), including, but not limited to, certified engineering geologist(s) licensed by the state of California. The geologist(s) must make a determination that a road and the road specifications are sufficient to result in a stable road prism that is not likely to trigger or exacerbate mass wasting.

4. Road stormproofing, road closure, and road decommissioning of existing roads are acceptable and encouraged on the mass-wasting areas of concern (identified above).
5. Before and/or after watershed analysis, the mass-wasting areas of concern can be further defined on the ground (ground-truthed) with respect to the area boundaries (size) as part of individual THPs. This refinement shall be conducted by the California Division of Mines and Geology (CDMG) or a qualified professional geologist, including but not limited to, certified engineering geologists licensed by the state of California.
6. The approximately 50,000-acre area that has not yet been characterized for mass wasting shall be treated in the interim, prior to characterization, as a mass-wasting area of concern and shall be correctly characterized with defined boundaries on a THP basis using the same process employed for the entire ownership or watershed analysis. The characterization will be conducted by CDMG or a qualified professional geologist, including but not limited to, certified engineering geologists licensed by the state of California.
7. The wildlife agencies and PALCO will jointly establish a mass-wasting scientific review panel (MWSRP) to evaluate the definitions of high, very high, and extreme mass-wasting areas of concern. The panel may modify the definitions. The high, very high, and extreme mass-wasting areas of concern will be redelineated for the entire ownership in accordance with any modified definitions.
8. The federal agencies, in consultation with state agencies, will provide a set of criteria to indicate whether mass-wasting events are to be considered significant for aquatic resources for use in the mass-wasting watershed analysis module.
9. Definitions of mass-wasting areas of concern:
 - **Inner Gorge**— That area of a watercourse bank situated immediately adjacent to the watercourse channel, having side slope of 65 percent or greater and extending from the edge of the channel upslope to the first break-in-slope (a break-in-slope is defined as a slope less than 65 percent for a distance of 100 feet or more) above the watercourse channel.
 - **Unstable Area**— Characterized by slide areas or by some or all of the following: hummocky topography consisting of rolling bumpy ground, frequent benches, and depressions; short irregular surface drainages that begin and end on the slope; tension cracks and head wall scarps; slopes that are irregular and may be slightly concave in the upper half and convex in the lower half from previous slope failure; evidence of impaired groundwater movement resulting in local zones of saturation within the soil mass which are indicated at the surface of sag ponds with standing water, springs, or

patches of wet ground. Some or all of the following may be present: hydrophytic vegetation prevalent; leaning, jackstrawed, or split trees are common; pistol butted trees with excessive sweep may occur in areas of hummocky topography (leaning and pistol butted trees should be used as indicators of unstable areas only in the presence of other indicators).

- **Headwall Swale**— A concave depression, with convergent slopes of 65 percent or greater, that is connected to waters via a continuous linear depression (a linear depression interrupted by a landslide deposit is considered continuous for this definition).
- **High, Very High, and Extreme Mass Wasting Hazard Areas**— Refer to the July 1998 Draft HCP, Volume II, Part D, Landscape Assessment of Geomorphic Sensitivity for the sensitivity ratings and to Volume V, Map 13.

6.3.3.8 Measures to Minimize Surface Erosion in Riparian Areas

1. Within RMZs and EEZs, PALCO will treat all sites of exposed mineral soils caused by forestry activities if they are equal to or greater than 100 square feet. Treatments may include revegetation or other erosion control measures including, but not limited to, seeding and mulching.
2. Within RMZs and EEZs, PALCO will treat all sites of exposed mineral soils, on hillslopes greater than 30 percent if the site can deliver fine sediment to waters. Treatments may include revegetation or other erosion control measures including, but not limited to, seeding and mulching.
3. Water crossings will also be treated to avoid or minimize sediment delivery, using watershed analysis and/or road stormproofing protocols to determine the appropriate treatments to be used on all such crossings.
4. Cable corridors that divert or carry water away from the natural drainage pattern or channelize runoff that reaches waters shall have waterbreaks installed at intervals as per skid trail prescriptions by Weaver and Hagans (1994).

6.3.4 Aquatic Habitat Conservation

6.3.4.1 Measures for Timber Operations

6.3.4.1.1 Channel Migration Zone

CMZ evaluation and mapping will be conducted as part of the watershed analysis process. All segments of Class I and II waters that have a Rosgen (1996) type C, D, or E channel morphology will be examined to identify the current boundaries of the CMZ. The CMZ boundary generally corresponds to the modern floodplain, but may also include river terraces that are subject to significant bank erosion. The CMZ is the area adjacent to the watercourse constructed by the river in the present climate and inundated during periods of high flow. The floodplain is delineated by either the flood-prone area or the 100-year floodplain, whichever is greater (Rosgen 1996).

Prior to watershed analysis, PALCO must analyze areas and delineate the CMZ on a THP basis using a qualified fluvial geomorphologist before any THP, including appurtenant roads, situated upslope of a channel with C, D, or E morphology can be approved. NMFS, CDFG, USFWS, and EPA or NCRWQCB will be consulted regarding any such mapping.

Within CMZs

CMZs prescriptions may be modified as a result of watershed analysis.

1. PALCO shall not harvest in the CMZ. This prohibition includes, but is not limited to, sanitation, salvage, exemption harvest, and emergency timber operation, as defined in the FPRs.
2. In case of emergencies that could result in the loss of life or property and as per prior agreement with the wildlife agencies, harvest may be allowed in the CMZ. Loss of property is defined as a demonstrated high risk of loss of capital improvements such as bridges, roads, culverts, and houses; however it does not include the loss of vegetation.

6.3.4.1.2 Class I RMZs

All fish bearing (or restorable) Class I waters will have an RMZ. The RMZ for Class I waters is divided into two bands, the no-harvest band and the outer band. The bands are measured from 0 to 100 feet, and 100 to 170 feet, respectively, from the watercourse transition line, as defined by the FPRs (14 California Code of Regulations [CCR] 895.1), or the outer edge of the CMZ (see below). Class I RMZ prescriptions may be modified as a result of watershed analysis.

Prescriptions for the Entire Class I RMZ

1. The RMZ measures 170 feet (slope distance) from the watercourse transition line or the outer CMZ edge (if a CMZ is present) on each side of the watercourse. Willows shall not be considered permanent vegetation for the purpose of determining the watercourse transition line.
2. No sanitation salvage, exemption harvest, or emergency timber operations (as defined and allowed in the FPRs) shall occur in the RMZ, except as per prior agreement with the wildlife agencies in accordance with the approved HCP.
3. All portions of downed wood (i.e., LWD), except as defined as slash in the FPRs, will be retained.
4. Trees felled during current harvesting operations and THP-approved road construction are not considered downed wood for purposes of retention.
5. Felled hazard trees or snags not associated with a THP are considered downed wood and are to be retained in the general vicinity.
6. Trees that fall naturally onto roads, landings, or harvest units within the RMZ are considered downed wood and are to be retained in the general vicinity.
7. All non-hazard snags will be retained, as per the snag policy in the HCP.
8. The RMZ is an EEZ for timber operations, except for roads and permitted equipment crossings.
9. Full suspension yarding will be used when feasible. Full suspension yarding is not feasible on flat ground, in other sites with limited deflection, where an adjacent landowner will not provide permission to secure a cable, or where a full suspension yarding system would jeopardize the safety of field personnel. For the purposes of

this prescription, the expanded definition of feasibility according to the FPRs does not apply as an additional determination beyond that described above. For these conditions, yarding will be conducted in a manner that avoids ground disturbance that might deliver sediment to waters to the maximum extent practicable. Where ground disturbance occurs, PALCO will treat (e.g., through seeding, mulching, etc.) all sites with exposed mineral soil that can reasonably be expected to deliver sediment to waters (e.g., gullies, ruts).

10. Trees not marked for harvest may be felled within the RMZ to provide safety clearance for cable yarding corridors. Such felling will be done only as needed to ensure worker safety. In such cases, to the extent possible given site conditions and the FPRs, trees will be felled toward the waters to provide LWD and will be identified in THPs as an in lieu practice (14 CCR 916.1). Regardless, trees felled within the RMZ for safety purposes will be retained as downed wood.
11. Trees not marked for harvest which are damaged in the cable yarding corridors must be retained in place, either standing or as downed wood.
12. There will be a maximum of one entry every 20 years.
13. If any area within the RMZ, including the 50 percent slope provision band, falls within the boundary of a mass-wasting area of concern, then the mass-wasting strategy applies for that area.

Prescriptions for Class I No-harvest Band, 0 to 100 Feet

1. No harvest, including sanitation salvage, exemption harvest, or emergency timber operations, shall occur in the no-harvest band.
2. Road segments within the first 30 feet of the no-harvest band must be mitigated by extending the no-harvest band on the opposite side of the waters from the existing road an equivalent distance of that portion of the road prism within the no-harvest band. In the case of RMZ road crossings, the first 50 feet of road extending inland from the watercourse transition line is exempt from this mitigation.

Prescriptions for the Late Seral Class I Outer Band, 100 to 170 Feet

1. Only single-tree selection will occur within the outer band.
2. Harvest will only occur in the outer band if there is a preharvest conifer basal area of 276 square feet per acre or greater within the outer band on each side of the waters.
3. A minimum 240-square-foot, post-harvest conifer basal area per acre within the outer band will be retained on each side of the waters.
4. No more than 40 percent of the conifer basal area may be harvested in a single entry.
5. Tree size and quantities shall be retained per Table 17 (July 1998 Draft HCP, Volume I). Larger tree size classes (including those larger than 40 inches) shall be used for replacement if stated size classes are not present.

6. Basal area measurements will be made for conformance at every 200-foot lineal segment of the RMZ. Surface area covered in roads and landings will be included in all calculations of basal area.
7. The 50 percent steep slope provision requires that for all slopes 50 percent and greater adjacent to the RMZ, the RMZ outer band prescriptions, at a minimum, shall be extended upslope to the break-in-slope (defined as a slope less than 50 percent for a distance of more than 100 feet) or upslope to a slope distance of 400 feet measured from the watercourse transition line or the outer edge of the CMZ, whichever is greater.

6.3.4.1.3 Class II RMZs

All non-fish bearing Class II waters will have an RMZ. The RMZ for Class II waters is divided into two bands, the no-harvest band and the selective entry band. The bands are measured from 0 to 30 feet, and 30 to 130 feet, respectively, from the watercourse transition line or the outer edge of the CMZ (see below). Class II RMZ prescriptions may be modified as a result of watershed analysis.

Prescriptions for the Entire Class II RMZ

1. The RMZ is 130 feet (slope distance) from the watercourse transition line or the outer CMZ edge (if a CMZ is present) on each side of the waters. Willows shall not be considered permanent vegetation for the purpose of determining the watercourse transition line.
2. No sanitation salvage, exemption harvest, or emergency timber operations (as defined and allowed in the FPRs) shall occur in the RMZ, except as per prior agreement with the wildlife agencies in accordance with the approved HCP.
3. All portions of downed wood (i.e., LWD), except as defined as slash in the FPRs, will be retained.
4. Trees felled during current harvesting operations and THP-approved road construction are not considered downed wood for purposes of retention.
5. Felled hazard trees or snags not associated with a THP are considered downed wood and are to be retained near the location of the removal.
6. Trees that fall naturally onto roads, landings, or harvest units within the RMZ are considered downed wood and are to be retained near the location of the removal.
7. All non-hazard snags will be retained, as per the snag policy in the HCP.
8. The RMZ is an EEZ for timber operations, except for roads and permitted equipment crossings.
9. Full suspension yarding will be used when feasible. Full suspension yarding is not feasible on flat ground, in other sites with limited deflection, where an adjacent landowner will not provide permission to secure a cable, or where a full suspension yarding system would jeopardize the safety of field personnel. For the purposes of this prescription, the expanded definition of feasibility according to the FPRs does not apply as an additional determination beyond that described above. For these

conditions, yarding will be conducted in a manner that avoids ground disturbance that might deliver sediment to waters to the maximum extent practicable. Where ground disturbance occurs, PALCO will treat (e.g., through seeding, mulching, etc.) all sites with exposed mineral soil that can reasonably be expected to deliver sediment to waters (e.g., gullies, ruts).

10. Trees not marked for harvest may be felled within the RMZ to provide safety clearance for cable yarding corridors. Such felling will be done only as needed to ensure worker safety. In such cases, to the extent possible given site conditions and the FPRs, trees will be felled toward the waters to provide LWD and will be identified in THPs as an in lieu practice (14 CCR 916.1). Regardless, trees felled within the RMZ for safety purposes will be retained as downed wood.
11. Trees not marked for harvest which are damaged in the cable yarding corridors must be retained in place, either standing or as downed wood.
12. There will be a maximum of one entry every 20 years.
13. If any area within the RMZ, including the 50 percent steep slope provision band and the sediment filtration band, falls within the boundary of a mass-wasting area of concern, then the mass-wasting strategy applies for that area.

Prescriptions for Class II No-harvest Band, 0 to 30 Feet

1. No harvest, including sanitation salvage, exemption harvest, or emergency timber operations, shall occur in the no-harvest band.
2. Road segments within the no-harvest band must be mitigated by extending the no-harvest band on the opposite side of the waters from the existing road an equivalent distance of that portion of the road prism within the no-harvest band. In the case of RMZ road crossings, the first 50 feet of road extending inland from the watercourse transition line is exempt from this mitigation.

Prescriptions for the Late Seral Class II Selective-entry Band, 30 to 130 Feet

1. Only single-tree selection will occur within the selective entry band.
2. Harvest will only occur in the selective entry band if there is a preharvest conifer basal area of 276 square feet per acre or greater within the selective entry band on each side of the waters.
3. A minimum 240-square-foot, post-harvest conifer basal area per acre within the selective entry band will be retained on each side of the waters.
4. No more than 40 percent of the conifer basal area may be harvested in a single entry.
5. Tree size and quantities shall be retained per Table 17 (July 1998 Draft HCP, Volume I). Larger tree size classes (including those larger than 40 inches) shall be used for replacement if stated size classes are not present.

6. Basal area measurements will be made for conformance at every 200-foot lineal segment of the RMZ. Surface area covered in roads and landings will be included in all calculations of basal area.
7. The 50 percent steep slope provision requires that the RMZ selective entry band prescriptions for all slopes 50 percent and greater adjacent to the RMZ, at a minimum, shall be extended upslope to the break-in-slope (defined as a slope less than 50 percent for a distance of more than 100 feet) or upslope to a slope distance of 400 feet measured from the watercourse transition line or the outer edge of the CMZ, whichever is greater.
8. For all slopes less than 50 percent adjacent to the RMZ, a sediment filtration band shall be established from 130 to 170 feet. All downed wood shall be retained within this band (except slash), fire ignition is prohibited, and the band is an EEZ.

6.3.4.1.4 Class III RMZs

All Class III waters will have an RMZ. The RMZ for Class III waters is divided into two bands. The RMZs are measured from 0 to 50 feet for slopes less than 50 percent and from 0 to 100 feet for slopes 50 percent and greater, measured from the watercourse transition line. Class III RMZ prescriptions may be modified as a result of watershed analysis.

Prescriptions for All Class III RMZs

1. A scientific and statistically valid study will be designed by an independent party jointly selected by PALCO and the wildlife agencies to address questions put forward by PALCO and the wildlife agencies regarding Class III input of sediment and large wood and the effectiveness of different prescriptions.
2. If any area within the RMZ falls within the definition of a mass-wasting area of concern, then the mass-wasting strategy applies.
3. All RMZ width requirements stop at the hydrologic divide.
4. All areas are EEZs for timber operations, except for roads and permitted equipment crossings. All tractor road water crossings must be flagged on the ground prior to the pre-harvest inspection and shown on the THP map in order to be adequately evaluated for the potential to generate sediment.
5. Skid trails shall be stabilized as per the 1998 FPRs, per an approved THP in accordance with the Class I/II watercourse standard.
6. All downed wood and debris shall be retained within the EEZs, except for cases of emergency as per agreement with the wildlife agencies.
7. All downed wood and debris in the channel shall be retained.
8. Trees felled during current harvesting operations and THP-approved road construction are not considered downed wood for purposes of retention.
9. Felled hazard trees or snags not associated with a THP are considered downed wood and are to be retained in the location of the removal.

10. Trees that fall naturally onto roads, landings, or harvest units within the RMZ are considered downed wood and are to be retained in the location of the removal.
11. Full suspension yarding will be used when feasible. Full suspension yarding is not feasible on flat ground, in other sites with limited deflection, where an adjacent landowner will not provide permission to secure a cable, or where a full suspension yarding system would jeopardize the safety of field personnel. For the purposes of this prescription, the expanded definition of feasibility according to the FPRs does not apply as an additional determination beyond that described above. For these conditions, yarding will be conducted in a manner that avoids ground disturbance that might deliver sediment to waters to the maximum extent practicable. Where ground disturbance occurs, PALCO will treat (e.g., through seeding, mulching, etc.) all sites with exposed mineral soil that can reasonably be expected to deliver sediment to a waters (e.g., gullies, ruts).
12. Trees not marked for harvest may be felled within the RMZ to provide safety clearance for cable yarding corridors. Such felling will be done only as needed to ensure worker safety. In such cases, to the extent possible given site conditions and the FPRs, trees will be felled toward the waters to provide LWD and will be identified in THPs as an in lieu practice (14 CCR 916.1). Regardless, trees felled within the RMZ for safety purposes will be retained as downed wood.
13. Trees not marked for harvest which are damaged in the cable yarding corridors must be retained in place, either standing or as downed wood.
14. PALCO shall not harvest in the 0- to 30-foot band, with the exception of a maximum of one entry, prior to watershed analysis, into 1,400 acres for harvest (identified in item 16 below) and 775 acres for commercial thinning (identified in item 17 below).
15. No sanitation salvage, exemption harvest, or emergency timber operations are allowed in the 0- to 30-foot band.
16. Subject to all other applicable HCP requirements and watershed analysis, harvesting is permitted on the 1400 acres of mid-successional and late seral vegetation types identified in the Sustained Yield Plan over the first five years in the 0- to 30-foot band, following the standards below:
 - One harvest entry, maximum, prior to watershed analysis
 - 0- to 10-foot, no-harvest band for protection of the channel and bank
 - Maximum removal of 1/3 conifer basal area per 200 linear feet
 - Harvesting will be distributed across all diameter classes
 - Trees removed for a road, skid trail or cable corridor will be counted towards the maximum volume and basal area calculations
 - All sub and non-merchantable conifers will be left standing onsite if feasible
 - No sanitation salvage, exemption harvest, or emergency timber operations
17. Subject to all other applicable HCP requirements and watershed analysis, commercial thinning is permitted on the 775 acres identified in the Sustained Yield Plan over the first five years in the 0- to 30-foot band, following the standards below:

- One thinning entry, maximum, prior to watershed analysis
- 0 to 10 foot no harvest for protection of the channel and bank
- Maximum removal of 1/3 conifer basal area per 200 linear feet
- Thinning will be distributed across all diameter classes
- The site will be recaptured within 5 to 10 years
- Trees removed for a road, skid trail or cable corridor will be counted towards the volume and basal area maximum
- All sub and non-merchantable conifers will be left standing onsite if feasible
- No sanitation salvage, exemption harvest, or emergency timber operations

Prescriptions for Class III Buffers with Slopes Less than 50 Percent

1. No-harvest band from 0 to 30 feet with the exception of the 1,400-acre harvest and 775-acre commercial thinning identified previously.
2. Sediment filtration band from 30 to 50 feet, apply all prescriptions identified above in items 1 through 13.

Prescriptions for Class III Buffers with Slopes 50 Percent and Greater

1. No-harvest band from 0 to 30 feet, with the exception of the 1,400-acre harvest and 775-acre commercial thinning identified previously.
2. Sediment filtration band from 30 to 100 feet, apply all prescriptions identified above in items 1 through 13.

6.3.4.2 Burning

1. No fire ignition shall occur in the RMZs and EEZs. Fire ignition shall occur so fire will back its way toward the RMZs and EEZs.
2. PALCO shall only ignite fires on one side of the RMZ at a time if topographic features and/or fuel patterns would increase the likelihood that fires lit on both sides of an RMZ would result in intrusion into the RMZ.
3. Burning is limited to spring and fall when fuel moisture conditions, relative humidity, fuel loading, and atmospheric conditions such as wind are conducive to controlled burning.
4. Fuel breaks in the RMZ shall be avoided. Minimal hand clearing for fuel breaks in the RMZ may be conducted to prevent and control escaped fires. No overstory removal will be undertaken. If areas of bare soil are exposed from fuel breaks or fire that could result in fine sediment inputs into Class I, II, or III waters, such areas will be treated as per the surface erosion requirements.
5. All burns are conducted pursuant to permits issued by CDF.
6. When available and feasible, a helitorch will be used to ignite fires for better directional and speed control of the fire.

6.3.4.3 Disturbance Index

1. As modified by the elements below, PALCO shall follow the process identified in the July 1998 Draft HCP, Volume II, Part E, Assessment of Watershed Disturbances and Recovery.
2. The disturbance index and its elements may be modified as a result of watershed analysis, subject to approval by the wildlife agencies.
3. The disturbance index will be calculated at the hydrologic unit scale for PALCO's ownership.
4. The disturbance index will be modified to account for all roads, distinct from other harvest activities.
5. Roads that are used or maintained at least once during the 10-year time factor will remain in the index calculation, and the disturbance ratings will not diminish over time.
6. Roads that are improperly abandoned as per the Weaver and Hagans (1994) definition will remain in the index calculation, and the disturbance ratings will not diminish over time. Roads that are properly closed or decommissioned are not considered to be improperly abandoned.
7. The disturbance index will be modified to account for all mass wasting events (landslides, debris torrents, etc.), distinct from other activities and ratings.
8. The upper limit of the disturbance index is set at 20 percent.
9. The initial disturbance indices, as modified, will be calculated for the entire ownership, at the hydrologic unit scale, within three months of the issuance of the ITP. PALCO shall submit this information to the wildlife agencies in a report form with the disturbance index and supporting calculations immediately following each hydrologic unit calculation. Subsequent calculations will be on a THP basis.
10. If the calculated index is at or above 20 percent, then PALCO shall refrain from all activities with the highest disturbance ratings, 0.7 and above, and cannot increase the index from one THP to another. Activities shall be conducted in a manner that lowers the index on an annual basis and shall be at or below 20 percent within the 10-year time factor.
11. To ensure that Class I sub-basin salmonid populations are not extirpated in the hydrologic units with a disturbance index in excess of 20 percent, PALCO shall apply the following restrictions until watershed analysis is complete and site-specific information is generated on Class I sub-basins. In addition to the following operational restrictions, PALCO shall conduct only those actions that result in a decrease in the index in Class I sub-basins until the index drops below 20 percent:
 - Conduct no clearcut or rehabilitation harvest.
 - Conduct full suspension skyline or helicopter yarding only.
 - Conduct no new road construction or reconstruction.

- Limit wet weather period operations (October 15 to June 1) to erosion control maintenance, planting, falling and bucking, and full suspension yarding to landings outside the sub-basin.
 - Conduct no broadcast burning.
 - Conduct no skid trail or layout construction.
 - Treat all areas of bare mineral soil outside of RMZs, EEZs, and equipment limitation zones (ELZs) created by timber operations of 400 square feet or any less than 400 square feet if the site can deliver sediment to streams.
 - Remove no more than 50 percent of the basal area in one entry.
12. If the index is below 20 percent, no activities will be conducted that will cause the index to exceed the 20 percent upper limit.

6.3.4.4 Measures for Other Plan Area Activities

6.3.4.4.1 Commercial Rock Quarries

Two commercial rock quarries are covered under the ITP for a period ending on March 1, 2001. These two rock quarries are identified as Rock Quarry 1/Road 24 in the Yager Creek drainage and Rock Quarry 2/Road 9 in the Lawrence Creek drainage.

1. PALCO shall continue to use engineered detention ponds and erosion control to reduce impacts on waters and riparian areas.
2. PALCO shall implement appropriate mitigation so that rock quarry operations do not result in a visible increase in turbidity in any drainage facility, work site, quarry area, etc, any of which drain to Class I, II, or III waters. Appropriate mitigation includes, but is not limited to, wet weather operating limitations, installation of sediment control structure, limitations on overburden placement and distribution, removal of spoil material, revegetation, and abandonment.
3. The site specifics of the rock quarries and their effects at the hydrologic unit scale shall be evaluated during watershed analysis. Additional mitigation, identified above, may be implemented depending on the results of watershed analysis.
4. The wildlife agencies commit to work with PALCO to process an amendment to the HCP to continue coverage of the two rock quarries after expiration of the initial two-year period.

6.3.4.4.2 Borrow Pits

Borrow pits are covered under the ITP for a five-year period ending on March 1, 2004.

1. PALCO shall utilize the same mitigation requirements for borrow pits as those required for roads, including the prohibition on new borrow pits in the RMZs, prohibition on new borrow pits in the mass-wasting areas of concern prior to watershed analysis, road construction/reconstruction standards, and wet weather operations.
2. Borrow pits will be mapped and analyzed for site-specific and hydrologic unit scale impacts as part of watershed analysis. Additional mitigation and minimization measures for borrow pits may be required as a result of watershed analysis. Additional mitigation may include, but is not limited to, installation of sediment

control structures, limitations on overburden placement and distribution, removal of spoil material, revegetation, and abandonment.

3. The wildlife agencies commit to work with PALCO to process an amendment to the HCP to continue coverage of borrow pits after the expiration of the initial five-year period.

6.3.4.4.3 Water Drafting

1. PALCO shall utilize the most current NMFS water drafting screen specifications. As of the effective date, the screen specifications described below are the most current and shall be used until they are replaced by NMFS.
2. The screen shall be kept in good repair and shall be used whenever water is drafting (i.e., pumped from the stream into a truck or trailer).
3. The screen face shall be parallel to the flow of the water.
4. The screen shall have an approach velocity of no more than 0.33 foot per second. The approach velocity is the velocity of the water through the screen openings.
 - The screen shall have at least 12 square feet of open area per cubic foot per second of the maximum diversion rate (12 square feet of screen per 450 gallons/minute).
 - Round openings shall not exceed 3/32 inch in diameter.
 - Square openings shall not exceed 3/32 inch measured diagonally.
 - Slotted openings shall not exceed 0.0689 inch in width (approximately 1/16 inch)
5. The screen shall be cleaned as often as necessary to prevent the approach velocity from exceeding 0.33 foot per second and to prevent the head differential through the screen from exceeding 2 inches.
6. The diversion rate shall not exceed the inflow rate.

6.3.5 Aquatic Monitoring

PALCO's current aquatic monitoring, including compliance, effectiveness, and trend, will be revised after each watershed analysis to respond to the specificity of prescriptions, assumptions, and questions for each hydrologic unit.

PALCO is responsible for the cost of the monitoring program.

6.3.5.1 Compliance Monitoring

Compliance monitoring activities will contribute to the goal of achieving 100 percent prescription implementation. Compliance monitoring includes four components: third-party monitoring, a THP checklist, the best management practice evaluation program (BMPEP), and application of the compliance findings.

6.3.5.1.1 HCP Monitor

The HCP monitor, as described in Section 6.13 shall have full access to PALCO's land at all times to inspect any covered activity and shall be present onsite during every timber harvest

conducted by or on behalf of PALCO. The HCP monitor shall also, at the request of the wildlife agencies, monitor the effectiveness of the Aquatics Conservation Plan.

6.3.5.1.2 THP Checklist

PALCO resource professionals preparing THPs and timber harvest exemptions and agencies conducting the environmental review of PALCO's plans will be guided by the "Pacific Lumber Company Timber Harvest Plan Checklist." The checklist will be used to confirm that all relevant elements of the PALCO Aquatics Conservation Plan are contained in the THPs and made enforceable under the THPs. PALCO and the wildlife agencies will revise the checklist during watershed analysis to create a THP checklist for each watershed to ensure implementation of watershed-specific prescriptions.

6.3.5.1.3 Framework, Best Management Practice Evaluation Program

PALCO will also conduct compliance monitoring as part of the BMPEP (example attached). PALCO shall use this approach to document how well the aquatic strategy prescriptions are being applied. This program sets criteria for determining which THPs will be monitored and integrates compliance monitoring requirements with effectiveness monitoring to minimize personnel costs and maximize efficiency.

Attached are an example of a worksheet and a description of an evaluation procedure developed for the BMPEP of the Pacific Southwest Region of USFS (USFS, 1992). This procedure is also used in a modified form by the California Department of Forestry and Fire Protection (CDF). The program identifies 28 hillslope evaluation procedures for implementation and effectiveness monitoring. The approach specifies how to sample sites to be evaluated, the timing and frequency of evaluations, details on what factors are to be rated and others. This program has been the subject of an ongoing review by USFS, EPA, and the California Water Resources Control Board.

PALCO will use the BMPEP framework to develop watershed-specific implementation and hillslope effectiveness monitoring protocols. PALCO will draft a separate evaluation procedure for related sets of prescriptions in the Aquatics Conservation Plan, including those on the THP Checklist (described above) and present each for review, revision, and final approval by the wildlife agencies within one year after issuance of the ITPs. As watershed analysis is completed for each hydrologic unit, revised sets of evaluation procedures will be developed following the BMPEP framework within 30 days after the final establishment of prescriptions. In the interim, the CDF protocols will be used in place of the BMPEP.

The elements of the compliance and hillslope effectiveness evaluation program and protocols will include the following:

1. A statement of required qualifications for those who will conduct the monitoring
2. Database and data storage, retrieval, and annual reporting requirements
3. A procedure and criteria for developing a random sample pool of THPs and exemptions for each HU from which THPs and exemptions are to be randomly selected and sampled
4. A procedure and criteria for developing random sample pools of sites from among the randomly selected THPs and exemptions for each type of prescription to be evaluated for implementation and hillslope effectiveness

5. A step-by-step procedure to identify sample site locations (e.g., for RMZs, roads, and harvest units) and the timing (e.g., after the first winter storms) of implementation and hillslope effectiveness monitoring for each of the prescriptions
6. For each evaluation procedure, detailed descriptions a) of how parameters are to be measured and b) of rating criteria
7. Confirmation that the relevant prescriptions were made part of the THP or exemption
8. Compliance and hillslope effectiveness monitoring evaluations in the field at the appropriate time using an evaluation form and rating criteria developed for each prescription
9. Procedures for timely forwarding of completed field forms, filing of forms, data entry, and database management and reporting to the reviewing agencies
10. Procedures for timely corrective actions

Initially, all THPs and exemptions in each hydrologic unit and calendar year that meet selection criteria approved by the wildlife agencies will be subject to compliance and hillslope effectiveness monitoring. Examples of selection criteria include plans where hillslope best management practices (BMPs) pertaining to erosion control and RMZs have been tested by winter storms, plans with specific geologic concerns, and others. PALCO and the wildlife agencies will develop selection criteria specific to the Aquatics Conservation Plan. Not every RMZ or road, however, in every THP and exemption need be evaluated. The individual random sample pools of sites for each related set of prescriptions will initially be comprised of at least 50 percent of the sites where the prescriptions are applied. The wildlife agencies, in consultation with PALCO, will decide whether this proportion of sites where prescriptions are applied will continued to be monitored. The decision will be based on the results of compliance and hillslope effectiveness monitoring presented in annual monitoring reports. In addition, the wildlife agencies will conduct quarterly audits of the compliance monitoring and annual audits of the hillslope effectiveness monitoring evaluations carried out by PALCO to help ensure monitoring protocols are being followed.

6.3.5.1.4 Application of Compliance Monitoring Findings

PALCO and the wildlife agencies shall identify recurring successes and problems with aquatic strategy prescription implementation by conducting 1) quarterly reviews of the compliance monitoring reports, 2) hillslope inspections, and 3) audits of how PALCO includes the aquatic strategy prescriptions in THPs and follows monitoring procedures. Problems with implementation shall lead to remedies that will include, but will not be limited to, training of personnel, adjustments in RPFs and licensed timber operators' oversight and supervision over contractors and field crews, changes in equipment, refinements of prescriptions, and regulatory sanctions.

6.3.5.2 Effectiveness Monitoring

PALCO, with input from the wildlife agencies and peer review panels, will craft hillslope effectiveness monitoring, instream effectiveness monitoring, and trend monitoring strategies for each hydrologic unit. The exact details of what, where, when, and how PALCO will monitor will be determined by questions and hypotheses posed by PALCO and the wildlife agencies. PALCO

and the wildlife agencies will develop these monitoring objectives based on the findings of watershed analysis and other sources of assembled information.

PALCO will use effectiveness monitoring as a basis for evaluating the results of carrying out prescriptions on the features or processes that occur on the hillslope and on those in the instream environment. Hillslope effectiveness monitoring will help PALCO determine whether properly implemented prescriptions on the hillslope actually work (e.g., properly installed water bars actually prevented road surface rill erosion). Instream effectiveness monitoring will be used to determine whether the prescriptions result in protection of aquatic values (e.g., maintained or decreased the percent of fine sediment in spawning riffles).

PALCO will monitor both instream and upslope conditions to assess the effectiveness of the Aquatics Conservation Plan. These effectiveness studies, in turn, will provide most of the impetus for the adaptive management component of the Plan.

6.3.5.2.1 Large Woody Debris and Riparian Buffers

PALCO will obtain baseline information on LWD levels and recruitment potential from riparian stands during the watershed analysis process for each HU, as well as through ongoing resource assessment efforts, including those of CDFG. This information will also be collected as part of PALCO's trend monitoring program (Section 6.3.5.3). PALCO and the wildlife agencies will develop questions and hypotheses to be tested through compliance monitoring and hillslope and instream effectiveness monitoring while using this baseline information.

PALCO's hillslope effectiveness monitoring will indicate whether forest stands within riparian buffers are developing increasing numbers of large trees. Information on stand conditions will be collected during THP preparation and review and through watershed analysis. As an initial indication of the effectiveness of correctly implemented prescriptions applied to riparian buffers, PALCO will show that currently understocked riparian stands will develop sufficient basal area and large trees to permit harvest.

6.3.5.2.2 Water Temperature

PALCO will monitor water temperatures during instream effectiveness monitoring and trend monitoring. PALCO will monitor instream water temperatures to see if recorded values show an increasing or decreasing trend over time. Water temperature data will be collected for at least five years to determine initial trends. PALCO will also determine the effectiveness of the aquatic strategy for temperature by monitoring changes in canopy closure over waters.

6.3.5.2.3 Sediment

In conjunction with instream effectiveness monitoring and trends monitoring, PALCO will monitor data on instream sediment levels, channel morphology, stream bed aggradation/degradation, and biological metrics sensitive to sediment (e.g., invertebrate diversity).

PALCO will assess the effectiveness of the sediment control measures by monitoring sediment production rates from roads and hillslopes. In this way, PALCO will detect any shortcomings in sediment control measures earlier than if the company depended only on instream conditions. PALCO will institute alternate management approaches to address identified shortcomings through the adaptive management process.

PALCO will conduct sediment source inventories as part of the watershed analysis process for each hydrologic unit. These studies will provide baseline data on the number, location, and size of sediment sources on the ownership. In addition, these studies will provide sediment budgets identifying the amount of sediment being delivered to waters from different sources. Within five years of completing the baseline sediment studies, PALCO will conduct followup studies. These will determine the extent to which these sediment sources remain active and new sources develop (e.g., how many slides have occurred in the interim), their relationship to management activities, and how the rates of management-related surface erosion and landslides compare to the rates in the baseline period. PALCO will continue to inventory surface erosion within harvest units, bank erosion, new landslides, and road-related failures as they occur. These followup studies will continue to be completed at five-year intervals in conjunction with the watershed analysis revisitations for the life of the PALCO Aquatics Conservation Plan.

Hillslope and instream effectiveness monitoring and trends monitoring will provide the necessary information for determining how the PALCO Aquatics Conservation Plan affects sediment delivery to waters. In addition, because the followup studies will examine the relationship between management and sediment production, PALCO will use study results as guidance on how to modify management activities, if necessary, to reduce sediment production through the adaptive management process.

Sediment parameters are perhaps the most difficult on which to conduct effectiveness monitoring. Given this difficulty, PALCO will modify its approach for determining the effectiveness of sediment control measures as new data and scientific results become available.

6.3.5.2.4 Amphibian and Reptile Habitat and Population Monitoring

PALCO will work with the USFWS and CDFG to develop a habitat module for all covered amphibians and reptiles. As this module is applied across PALCO's ownership, information that will help monitor the effectiveness of aquatic prescriptions to protect amphibians and reptiles will become available. This module will be included in all watershed analyses.

PALCO and the agencies will conduct instream effectiveness monitoring to determine the adequacy of the aquatic strategy for amphibian and reptile species. For this purpose, PALCO will use the temperature, sediment, and LWD information that will be collected on both Class I and II waters. PALCO will modify amphibian and reptile monitoring efforts as new data and scientific results become available.

6.3.5.2.5 Cost-benefit Effectiveness

Cost-benefit effectiveness studies are needed to determine whether the benefits of protective measures being implemented by PALCO in the field are proportional to the costs to the company. Similarly, such studies could identify alternate mitigation approaches that continue to protect resources, but at lower costs to the company. At present, PALCO is generally able to identify the costs of specific mitigation measures with greater ease and certainty than it can identify the benefits of these measures to fish and wildlife. As PALCO obtains new information on the biological benefits of mitigation within the Aquatics Conservation Plan, PALCO will be able to more accurately assess the relationships between costs and benefits.

6.3.5.2.6 Hillslope Effectiveness Monitoring

Framework: BMP Evaluation Program

Refer to the discussion above regarding compliance monitoring for a description of the BMPEP.

Application of Hillslope Effectiveness Monitoring Findings

PALCO and the wildlife agencies will identify recurring successes and problems with the PALCO Aquatics Conservation Plan effectiveness on the hillslope by 1) conducting annual reviews of the hillslope effectiveness monitoring reports, 2) hillslope inspections, and 3) audits of monitoring procedures. Problems with hillslope effectiveness may lead to modification of prescriptions through adaptive management.

Instream Effectiveness Monitoring— The overriding objective of instream effectiveness monitoring in the PALCO Aquatics Conservation Plan is to determine, in a timely manner, whether the prescriptions applied to the hillslope are effective in protecting and improving the condition of aquatic resources. If prescriptions are not effective, this should be determined by PALCO and the agencies, and the prescriptions should be modified through adaptive management as soon as possible to prevent unanticipated adverse effects.

Instream effectiveness monitoring provides a means for assessing how individual prescriptions and management regimes as a whole are effective in protecting and restoring aquatic values. Instream effectiveness monitoring complements hillslope monitoring by providing a further basis for determining whether the prescriptions applied on the hillslope, including in riparian zones, effectively control the rates and types of watershed inputs to waters. Because instream conditions integrate all watershed inputs, however, relating measurements of instream conditions to the effectiveness of individual prescriptions may be difficult (MacDonald and others, 1991). Nevertheless, carefully designed instream effectiveness monitoring intended to answer specific questions can provide information that PALCO and the agencies can use to modify prescriptions and adapt management regimes to better protect water quality and aquatic species and their habitats.

Instream effectiveness monitoring, in contrast to trends monitoring, should be carried out as close as possible to where the impact mechanisms on the hillslope are at play. Instream effectiveness monitoring should occur in tributary waters, higher up in watersheds, or in locations intimately linked to hillslope processes. Monitoring conducted in such locations holds the greatest promise for establishing timely feedback mechanisms through which PALCO and the agencies can identify which prescriptions or procedures are not effective in protecting and restoring aquatic values and then modify them through adaptive management.

6.3.5.2.7 Instream Monitoring Approach

PALCO will develop and implement, with the oversight and concurrence of the agencies, instream monitoring approaches for two contexts: 1) watersheds where watershed analysis has not been completed and 2) watersheds which have been or are the subject of watershed analysis. PALCO, in consultation with the agencies, will design general instream effectiveness monitoring approaches for the former using a combination of the following: baseline information compiled for the PALCO Aquatics Conservation Plan, other information as it becomes available through watershed studies, resources inventories and monitoring conducted or mandated by public agencies (e.g., CDFG, RWQCB, CDF, and others), input from resource

professionals familiar with conditions in the local watersheds, and the public living in or near the watersheds to be monitored. While designing the approaches for instream effectiveness monitoring in watersheds subject to watershed analysis, PALCO and the agencies will use these same information sources; however, the instream effectiveness monitoring designs will benefit from the focused watershed-specific assessments and syntheses that are integral components of watershed analysis. PALCO will iteratively use these insights gained from the watershed analysis assessments and syntheses to design instream effectiveness monitoring elsewhere.

6.3.5.2.8 Instream Effectiveness Monitoring Objectives

All monitoring should be for the purpose of achieving focused objectives, answering specific questions, or testing well-considered hypotheses. This is particularly true for instream effectiveness monitoring. The following are examples of mechanistic null hypotheses that illustrate the types of questions PALCO will answer through its instream effectiveness monitoring program:

Hypothesis— There is no significant increase in streambank instability and scouring of Class III waters with gradients greater than three percent by the end of the first winter period after clearcutting through the application of Class III EEZ prescriptions.

Hypothesis— There is no significant (less than 20 percent) increase in turbidity in Class II waters from the inflow of Class III waters adjacent to high-lead, cable-yarded clearcut harvest units through the application of the aquatic strategy Class III EEZ prescriptions.

Hypothesis— There is no significant decrease in residual pool volume in Class I and Class II waters tributary reaches with gradients less than three percent after clearcutting and high-lead cable yarding through the effectiveness of RMZ widths in holding materials transported from shallow-seated landslides in check.

Hypothesis— There is no significant reduction of overstory tree canopy in Class II RMZs from wind throw after commercial thinning because of pre- and post-harvest tree stocking or RMZ widths, or both, reducing wind-related depth-of-edge effects.

Hypothesis— There is no significant increase in summer (mid-July to mid-September), late afternoon average maximum temperatures measured in pools in Class I waters because low water temperatures are maintained in contributing Class II waters.

These examples of hypotheses to be tested through instream effectiveness monitoring illustrate how carefully questions have to be developed before designing and implementing instream effectiveness monitoring. They point to the need to establish criteria for determining what is significant (e.g., less than 20 percent), to clearly describe what exactly is to be monitored (e.g., turbidity vs. suspended sediment) and to specify where and when monitoring will occur (e.g., in Class III tributaries with gradients greater than three percent contributing to Class II waters from mid-July to mid-September in late afternoon). The hypotheses are stated in mechanistic terms to help ensure that the monitoring is directed toward investigating the linkages between prescriptions applied to the hillslope and instream conditions. They also suggest how testing one hypothesis through monitoring might lead to another, through an accumulative method of inductive inference. By employing such a process of strong inference (Platt 1964), PALCO and the agencies will clarify which prescriptions of the aquatic strategy are inadequately holding impact mechanisms triggered by management activities in check.

PALCO will develop these types of hypotheses and the instream effectiveness monitoring strategies with the participation of the watershed analysis team members and agencies. Where the watershed analysis process has not been initiated, PALCO and the agencies will develop sets of hypotheses to be tested through instream effectiveness monitoring. These hypotheses are informed by the experiences gained where watershed analysis has been completed elsewhere in the region. In both circumstances, the actual hypotheses to be tested will be determined by the salient circumstances, management regimes, and prescriptions specific to each hydrologic unit. Finally, PALCO and the agencies will establish a peer review panel to bring in interdisciplinary expertise to critique monitoring proposals on an annual basis, if necessary.

6.3.5.2.9 Application of Instream Effectiveness Monitoring Findings

PALCO and the agencies will use the results from the annual reviews of instream effectiveness monitoring to modify prescriptions that are identified as ineffective in protecting and restoring aquatic resources through the adaptive management process. At the same time, insights gained from this monitoring will confirm what prescriptions are working well. The changes in prescriptions will be designed to fit specific circumstances and impact mechanisms. For example, instream effectiveness monitoring might indicate that unacceptable increases in turbidity in Class III waters occur on certain soils after the adjacent stands on slopes greater than 50 percent have been clearcut, yarded by high-lead cable, and broadcast burned. This may lead to PALCO modifying, among other items, the timing of timber operations, the regeneration and yarding methods, and the level of vegetation retained within EEZs under these circumstances. If, under otherwise similar circumstances, instream effectiveness monitoring suggests that little or no increase in turbidity is found when the adjacent hillslopes are subject to intermediate treatments (e.g., commercial thinning), then the management regime and prescriptions would be retained until the emergence of evidence to the contrary. The monitoring activity should continue long enough, however, to ensure that the prescriptions are being tested under a wide range of conditions, including large but infrequent storm events.

6.3.5.3 Trend Monitoring

According to MacDonald and others (1991), trend monitoring implies a process where measurements are made at regular, well-spaced time intervals to determine a long-term trend in a particular parameter. This type of monitoring typically is not intended to evaluate specific management practices (as is the case with effectiveness monitoring). The results of trend monitoring, however, can corroborate the findings of effectiveness monitoring. Conversely, they can indicate changes at different time and spatial scales than those by which effectiveness monitoring indicates changes. Trend monitoring can also serve to indicate whether watersheds as a whole are on a long-term trajectory of recovery from both natural and management-related perturbations.

Adaptation of the Current Trend Monitoring Program to the PALCO Aquatics Conservation Plan— PALCO already has a significant trend monitoring program in place on its lands. The company has installed 52 permanent sampling stations. At each station, aquatic macroinvertebrates, fine sediments, substrate size, and crown cover are measured. In addition, stream bed surveys and measurements of continuous temperature and LWD are conducted at a subset of the 52 stations. Details of the data collection/analysis efforts associated with this program are as follows:

- Aquatic macroinvertebrates are collected using methods in the California stream bioassessment procedures (CDFG, March 1996). This methodology involves sampling riffle habitats using a kick net. Collected invertebrates are preserved in the field. In the laboratory, the samples are subsampled, and the first 300 invertebrates identified to family, and, where possible, to genus. The samples are being identified by Lauck, Lee and Lauck Inc. Their results are used to calculate abundance (if less than 300), species richness (i.e., number of taxa), and the Simpson and Hilsenhoff diversity indices.
- Bulk sediment samples are being used to assess the percentages of fine sediments (less than 0.85mm and less than 4.7mm) as indicators of suitability for salmon spawning. PALCO is using the shovel sample technique as described in "Field Comparison of Three Devices Used to Sample Substrate in Small Streams," by Grost and Hubert, 1991. Collected samples are processed by CDFG under contract to the company.
- Pebble counts are being used to calculate the median and 84th percentile sediment size (e.g., D50 and D84). These sediment measures can be tracked over time to determine whether sediments in a watercourse are generally becoming coarser or finer, relative to both sediment loading rates and cumulative effects from management activities. Pebble counts are being collected using the method described in "Stream Reference Sites," by Harrelson et al., 1994.
- Measurements of water temperature over the summer are taken with continuous recording thermometers (Hobos or Stowaways). In addition, point measurements of temperature are taken during most other monitoring activities. Temperature data are used to calculate the maximum weekly average temperature (MWAT).
- Canopy cover (percent) is being used to identify areas that may be subject to higher thermal loading (e.g., from sunlight) and to document regrowth of riparian areas harvested in the past. Measurements are taken using a spherical densimeter using methods in Flosi and Reynolds, 1996.
- Streambed surveys are being conducted to determine how streambed elevation is changing over time. This, in turn, is related to both sediment and LWD loading to waters. The methods for these surveys were developed by Dr. Bill Trush (Humboldt State University) in cooperation with the Simpson Timber Company. The method involves measuring the elevation of the channel thalweg using an engineers' level and permanent benchmarks that can be used to compare results among survey periods. PALCO has also begun measuring channel cross sections using permanent benchmarks to track changes in channel width/shape over time.
- As part of the stream bed surveys, PALCO is measuring the abundance (i.e., the percentage of channel length composed of pools), size, and depth of pools within each study reach.
- LWD is being measured because of its value in creating fish habitat and to assess how much LWD recruits from riparian buffers along the stream. The diameter, length, and location of all LWD pieces in the thalweg mapping segments are being recorded yearly.

Although not currently a part of PALCO's trends monitoring program, PALCO intends to collect data on fish abundance, turbidity, and discharge in the future. For fish, PALCO will establish a number of survey reaches across the ownership. Where possible, these reaches will be selected to correspond to locations already being measured for the trends monitoring variables noted

above. These survey reaches will be assessed twice yearly, during the summer (July to August), and again during the spawning season (the timing of which will vary from year to year). Summer surveys will be conducted using electrofishing, underwater observation, seining, angling, or other methods, as appropriate, although preference will be given to quantitative methods if they are feasible. Spawner surveys will primarily be conducted using visual observation techniques, although trapping, seining, or angling may be used to collect individual fish for measurement, identification, or radio tagging.

Turbidity measurements were recommended in a review of PALCO's monitoring program prepared for EPA by Randy Klein (Klein 1997). Although expensive compared to other sampling efforts used in PALCO's monitoring program, Klein's review suggested that turbidity could be an effective way to determine whether fine sediment inputs to waters are increasing or decreasing over time. The company proposes to establish pilot turbidity monitoring stations. Results from this pilot program will be used to determine how and where to expand the program.

Historically, the U.S. Geological Survey (USGS) measured stream discharge at a series of stations on or adjacent to PALCO's land (e.g., Freshwater Creek, Larabee Creek). PALCO provided financial support for reestablishment of a gaging station on the Elk River and intends to continue operation of this gage. The company is also considering establishment of gaging stations on Freshwater Creek, Yager Creek, and possibly in one or more of the smaller watersheds draining into the Eel River (e.g., Bear Creek). This monitoring effort would also be relatively expensive. PALCO and the agencies' decision on where to undertake this program will be made in the future based on the results of the Elk River pilot study and watershed analyses conducted there and in other hydrologic units.

PALCO recognizes that new data or scientific studies and the findings of watershed analysis will result in future identification of other variables that would be valuable to monitor. Therefore, at their discretion, PALCO and the agencies will add to the list of monitoring variables outlined here at a later date.

Klein (1997) discussed the distribution of monitoring sites on PALCO's lands, and suggested installation of additional monitoring sites. PALCO agrees that some portions of its lands, for example, the Elk River drainage, have few monitoring sites relative to their land area. In part, this is a result of statistical chance, as many sites were chosen using randomization techniques. However, it is also true that the company made the decision to intensively survey the Freshwater and Lawrence creek basins to more accurately assess the potential impacts of its forest practices. PALCO intends to continue this intensive approach to sampling in these basins, especially given concerns over the potential for cumulative effects. However, the company also anticipates adding new monitoring sites to fill any gaps in its coverage. Selection of specific sites will be included as part of the watershed analysis process the company will conduct on its lands.

PALCO and the agencies will review the current 52 monitoring locations and activities. They will confirm that the original intent underlying the selection of locations and instream parameters to be measured is consistent with the monitoring needs of the Aquatics Conservation Plan and follow the guidelines for monitoring found in the HCP Handbook (1996). This review will address and respond to comments from the public and local watershed specialists regarding PALCO's current trend monitoring effort. PALCO and the agencies will provide important details regarding monitoring objectives and hypotheses, sampling, and

measurement methodologies, monitoring locations and distribution, frequency of sampling, and statistical analyses. These cannot be finalized and disclosed at this time, but must await the findings of watershed analysis, further quantitative and qualitative resource assessment and analysis (i.e., for the interim, for those hydrologic units where watershed analysis is not yet completed), or both. As stated in the HCP Handbook (1996), trend monitoring measures will be "as specific as possible and be commensurate with the project's scope and the severity of its effects." Further, PALCO and the agencies will develop target milestones for the life of the HCP for key instream parameters. These will necessarily be specific to each hydrologic unit, as their development must be informed and conditioned by prevailing physical conditions specific to each hydrologic unit.

As a further assurance that PALCO's trend monitoring program will follow the guidelines of the HCP Handbook (1996) and show clear trend information on the condition of waters in watersheds affected by implementation of the Aquatics Conservation Plan, PALCO and the agencies will establish a peer review panel comprised of scientists, resource professionals, and the public living in and near the hydrologic units to be monitored. The panel will review the initial trend monitoring strategies developed by PALCO and the agencies and will provide recommendations for improvements. The peer review panel will validate that appropriate questions are being asked and that the proposed monitoring strategies are practicable and will give answers and management directions. The ultimate form of the trend monitoring will be approved by the reviewing agencies through the watershed analysis process.

6.3.5.3.1 Application of Trend Monitoring Findings

As stated above, trend monitoring alone is not an appropriate tool to evaluate the responses of watersheds and waters to specific management practices. This form of monitoring can, however be used to assess whether hillslope and instream attributes and functions are leading toward or away from properly functioning conditions and recovery. With the oversight of the agencies through annual reviews and the THP review process, PALCO will use the results of trend monitoring as part of the cumulative effects analyses in watershed analysis. In turn, PALCO will, where appropriate, effect watershed-specific modifications in management regimes to reverse trends that lead away from properly functioning aquatic habitat conditions, or will modify management restrictions to be more flexible for the company, when appropriate, through the watershed analysis prescription process or adaptive management.

6.3.6 Adaptive Management

Adaptive management will be used to change elements of the Aquatics Conservation Plan in response to a determination of the effectiveness of current elements of the conservation plan for protecting and restoring stream conditions and fish populations. Thus, the effectiveness of the conservation plan is assessed by examining conditions on PALCO's ownership and determining if management is maintaining or achieving, over time, properly functioning aquatic habitat conditions.

Changes in elements of the conservation plan are warranted if information from watershed analysis, monitoring, any scientific studies conducted as part of the Plan, or any other source show that properly functioning aquatic conditions are not being maintained. The following circumstances would warrant change:

- If the Plan is not substantially moving the aquatic habitat towards achieving properly functioning habitat conditions

- If a more cost-effective technique exists to attain the same biological or physical outcome
- If the information shows that PALCO can gain flexibility in the prescriptions and still attain properly functioning conditions
- Adaptive management is the means to ensure that the conservation plan maintains or achieves, over time, the habitat goal of a properly functioning aquatic condition.

PALCO may, at any time, propose changes to elements of the aquatics conservation plan that are not in conflict with AB 1986 as part of adaptive management. At PALCO's request, any such changes proposed by PALCO shall be promptly reviewed by the peer review panel established pursuant to Section 3.1.3.1(k) of the Implementation Agreement. PALCO and, if applicable, the peer review panel, shall provide to the Wildlife Agencies a written evaluation as to whether the proposed changes will impair the ability of the aquatics conservation plan to maintain or achieve, over time, properly functioning aquatic habitat conditions. The Wildlife Agencies will consider PALCO's proposed changes, the peer review panel's written evaluation, if any, and other available information. The Wildlife Agencies shall approve PALCO's proposed changes that are not in conflict with AB 1986 unless they find, in writing, that PALCO's proposed changes will impair the ability of the aquatics conservation plan to maintain or achieve, over time, properly functioning aquatic habitat conditions.

6.4 BALD EAGLE CONSERVATION PLAN

6.4.1 Management Objectives

1. Implement nest site identification and protection measures that have a high probability of providing for successful nesting of bald eagles.
2. Minimize disturbance of foraging bald eagles.

6.4.2 Conservation Measures

6.4.2.1 Surveys

1. Focused surveys for bald eagle nests shall be conducted for THPs located within 0.5 mile of Class I waters that provide potential foraging habitat. Potential nesting habitat (old-growth or residual forest with trees more than 40 inches in diameter) within THP areas and out to 0.5 mile from their boundaries shall be surveyed during the breeding season immediately prior to beginning operations. Operations shall not start until surveys have been completed.
2. Surveys for eagles and their nests shall be conducted between March 1 and April 15. Surveys shall consist of at least three site visits, one of which shall occur after April 1. Thorough searches of the survey area shall be conducted for eagles and their nests. Repeated float trips down Class I waters that provide potential foraging habitat or surveys conducted by airplane or helicopter to search for adult birds and nests may be necessary. All surveys conducted by helicopter or airplane will be designed with the assistance of the wildlife agencies to avoid the possibility of disturbing eagles at unknown nest sites.
3. If bald eagles are observed during surveys, additional visits shall be conducted to determine if eagles are nesting within a THP area or within 0.5 mile of the THP

boundary. This determination may be aided by observing the eagle's behavior, location, and direction of flight. Plan operations shall not commence until surveys have been completed, and the results of any positive surveys have been reviewed and approved by USFWS and CDFG.

4. Although most bald eagle nests are likely to occur within 0.5 mile of foraging habitat, they could potentially occur anywhere in the Plan Area where nesting habitat is suitable. Therefore, all THPs shall be evaluated for the existence of suitable nesting habitat and localized searches for nests and eagles shall be conducted as appropriate.
5. Documentation (i.e., survey forms and written summary) of field surveys performed for THPs shall be provided to USFWS and CDFG annually.
6. Field personnel shall be trained to recognize bald eagle nests and other signs indicating their presence, and shall be directed to report all sightings of eagles or nests to PALCO's wildlife biologist.

6.4.2.2 Nest Site Protection Measures

1. Active nest trees shall be defined as a tree used by bald eagles for nesting at least once within the previous five years. If inadequate data exist to document the status of individual nests, they shall be considered to be active. Occupied nests shall be defined as nests currently being used by bald eagles for reproduction. This shall include territorial behavior by one or more adults in the vicinity of a known nest, nest construction, egg laying, incubation, or rearing of young.
2. No trees within 500 feet of an active bald eagle nest shall be cut without prior consultation and concurrence from the USFWS and CDFG. Harvest within the 500-foot radius will be limited to prescriptions which will enhance long-term eagle habitat; such as precommercial or commercial thinning, selection, or an alternate prescription.
3. Timber operations including helicopter yarding, shall not occur closer than 0.5 mile from occupied nests during the breeding season (January 15 through August 15, or post-fledging). Blasting or pile driving activities shall not occur within one mile of occupied nests. Disturbance buffers may be modified with consultation and concurrence by USFWS and CDFG based upon topographic and other site-specific and project-specific circumstances. Disturbance buffers may also be lifted through monitoring and a determination that the site is not occupied, that nesting is not occurring, that it has failed, or that the young have fledged.

6.4.2.3 Mitigation for Disturbance of Foraging Eagles

1. Skyline cables over Class I waters shall be marked to reduce the possibility of collisions when operating in or adjacent to known bald eagle foraging habitat.
2. Winter foraging by bald eagles on the PALCO ownership is currently known to occur between November and February, but is uncommon. Implementation of the aquatic strategy, specifically measures to reduce disturbance in CMZs and Class I RMZs and restrictions on winter use, construction, reconstruction, and storm-proofing of roads are expected to effectively minimize the potential for disturbance.

6.4.3 Monitoring

Nest sites for which buffers are established shall be monitored during the breeding season each year the THP is in effect and for at least one breeding season following completion of the plan. Annual reports describing monitoring efforts shall be provided to the USFWS and CDFG. These reports shall disclose the dates of surveys, identity of surveyors, survey methods, and results (nest condition, occupancy rates, and nesting success).

At five-year intervals, PALCO, USFWS, and CDFG shall meet to review the results of monitoring activities and to evaluate implementation and effectiveness of measures and potential procedural improvements.

6.5 PEREGRINE FALCON CONSERVATION PLAN

6.5.1 Management Objectives

Implement nest site identification and protection measures which have a high probability of providing for successful nesting of peregrine falcons.

6.5.2 Conservation Measures

6.5.2.1 Surveys

Surveys of potential nesting habitat (i.e., at Scotia Bluffs, Holmes Bluff, or any other location where suitable cliffs over 70 feet in height occur) shall be conducted within THP areas and within 0.5 mile of their boundaries if operations will occur during the breeding season (January 15 to August 15). This distance shall be increased to one mile for projects involving blasting or pile driving activities. Surveys shall follow the guidelines in Pagel (1992), Protocol for Observing Known and Potential Peregrine Falcon Eyries in the Pacific Northwest, any year operations will occur.

1. Field personnel shall be trained to recognize peregrines and potential nesting habitat.
2. Documentation (i.e., survey forms and written summaries) of field surveys performed for THPs shall be provided to USFWS and CDFG annually.

6.5.2.2 Nest Site Protection Measures

1. No trees within 500 feet of an active peregrine falcon nest shall be cut without prior consultation and concurrence from USFWS and CDFG.
2. To minimize disturbance, timber operations shall not occur closer than 0.5 mile from occupied nests during the breeding season. Blasting, pile driving, helicopter yarding, or similar activities (other than ambient conditions) capable of introducing loud noise shall not occur within one mile of occupied nests.
3. Disturbance buffers may be modified with consultation and concurrence by USFWS and CDFG based upon topographic and other site-specific and project-specific circumstances. Disturbance buffers may also be modified through monitoring and a determination that the site is not occupied, that nesting is not occurring or has failed or that the young have fledged. Surveys shall follow the guidelines in Pagel

(1992), "Protocol for Observing Known and Potential Peregrine Falcon Eyries in the Pacific Northwest."

6.5.3 Monitoring

Nest sites for which buffers are established shall be monitored during the breeding season each year the THP is in effect and for at least one breeding season following completion of the plan. Annual reports describing monitoring efforts shall be provided to USFWS and CDFG. These reports shall disclose the dates of surveys, identity of surveyors, survey methods, and results (nest condition, occupancy rates, and nesting success).

At five-year intervals, PALCO, USFWS, and CDFG shall meet to review the results of monitoring activities and to evaluate implementation and effectiveness of measures and potential procedural improvements.

6.6 WESTERN SNOWY PLOVER CONSERVATION PLAN

1. Avoid impacts to western snowy plover nesting on gravel bars.

6.6.1 Conservation Measures

PALCO will conduct reconnaissance-level surveys (as described in U.S. Army Corps of Engineers [USACE] gravel extraction permits for the area) on gravel bars above the Rio Dell bridge. If reconnaissance level surveys locate plovers above the Rio Dell bridge, full protocol surveys will be instituted on all gravel bars within one mile of the sighting. If snowy plovers are detected, the individual(s) shall be observed for evidence of nesting behavior. If a nest site is discovered, a 1,000-foot seasonal operations buffer will be applied until the end of the breeding season (March 24 to September 15), until it is determined that the nest has failed, or until nesting has been completed.

If PALCO acquires rights to gravel bars on the Eel River downstream from the Rio Dell bridge, those bars shall be surveyed in full compliance with the USFWS protocol existing at the time, and nest protection measures implemented will be consistent with measures used in the Eel River area at the time. If the species' breeding range is determined by any means to extend up the Eel River to the Rio Dell bridge, PALCO shall begin full protocol surveys of gravel bars above the Rio Dell bridge and, if nests are located, implement nest protection measures as above. PALCO shall evaluate proposed gravel extraction levels with respect to potential indirect effects downstream. Within three years of permit issuance, PALCO and the agencies will meet to evaluate indirect effects of extraction on downstream gravel bars and to determine whether practicable mitigation measures would be appropriate.

6.7 BANK SWALLOW CONSERVATION PLAN

6.7.1 Management Objectives

1. Avoid impacts to bank swallow nesting colonies on streambanks and hillsides.
2. Prevent nest colony establishment in stock-piled sand associated with instream mining operations.

6.7.2 Conservation Measures

Aquatic conservation measures, principally the CMZ and RMZ measures, will minimize potential disturbance to nesting colonies.

Where new road construction crossing low gradient Class I waters is planned, and potential bank swallow habitat exists, PALCO shall survey the proposed alignment during the nesting season, once in May and once in June to identify any nest colonies within 200 feet of the construction area. These surveys shall be separated by at least one week. If nest colonies are found, PALCO shall consult with USFWS and CDFG to jointly develop, and PALCO shall implement, measures which shall maintain the nest colony.

Activities that may indirectly impact or disturb active nest colonies shall be separated by at least a 200-foot buffer during May and June. Alternative mitigation measures may be developed through consultation with USFWS and CDFG.

PALCO shall attempt to prevent bank swallows from nesting in stock-piled sand associated with instream mining operations by using netting or other means developed in consultation with USFWS and CDFG.

6.7.3 Monitoring

When conservation measures 2 or 3 are implemented, PALCO shall monitor the nest colony each year that the covered activity operates within 300 feet of the site and for one year following cessation of operations. Monitoring shall be conducted to determine the approximate dates that the colony is established and abandoned, and the approximate number of adult birds and to document any indication that disturbance adversely affects success of the colony. Documentation (i.e., survey forms and written summary) of field surveys shall be provided to USFWS and CDFG annually. Locations of identified colonies shall be reported by PALCO, within 90 days of discovery, to the CDFG NDDB.

At five-year intervals, PALCO, USFWS, and CDFG shall meet to review the results of monitoring activities and to evaluate implementation and effectiveness of measures and potential procedural improvements.

6.8 PACIFIC FISHER CONSERVATION PLAN

The conservation strategy for this species is a combination of a habitat-based approach and an additional structural component element. Specifically, the silvicultural requirements associated with RMZs, mass-wasting avoidance strategy, cumulative effects/disturbance index restrictions, marbled murrelet conservation areas, and the retention standard of 10 percent late seral habitat for each WAA are likely to provide for denning and resting habitat for Pacific fishers.

6.8.1 Management Objectives

Maintain enough suitable habitat to contribute to a sustainable population of Pacific fishers in the coastal province of northern California.

6.8.2 Conservation Measures

Retention of late seral habitat on the ownership through the life of the permit is expected to provide sufficient habitat in terms of quantity, quality, and distribution to contribute to a viable

population. CMZs and RMZs are expected to provide connectivity across the landscape. In many locations, CMZs and RMZs will intersect with other RMZs or be augmented by habitat subject to silvicultural restrictions (e.g., NSO activity sites, mass-wasting sites, or steep slopes adjacent to RMZs). These areas, MMCAs, and adjoining public lands will form an interconnecting network of habitat which is expected to provide opportunities for denning and resting sites in the Humboldt, Yager, and Van Duzen WAAs. PALCO land within the Bear, Mattole, and Eel WAAs is not expected to provide blocks of late seral habitat through the life of the permit. Late seral and old growth habitat on public lands adjacent to PALCO ownership in these two WAAs is expected to provide suitable habitat for the species.

The conservation measures to retain and recruit habitat structural components within and outside of RMZs across the ownership are expected to provide older forest legacies in younger stands when these stands reach a mid-successional seral stage. These legacy components are expected to provide suitable substrate for Pacific fisher denning and resting sites.

6.8.3 Implementation/Compliance Monitoring

Seral stage distribution will be tracked and reported as described in the conservation measures described in this appendix under Section 6.11, Measures to Conserve Habitat Diversity and Structural Components.

6.8.4 Effectiveness Monitoring

Within one year of permit issuance PALCO, USFWS, and CDFG will jointly develop a forest carnivore survey methodology. The objective will be to determine the extent of Pacific fisher use of habitat types and seral stages present on PALCO lands.

The research/monitoring project will begin by the end of the second year after permit issuance. Five years after starting the research monitoring project, PALCO, USFWS, and CDFG shall meet to review the results of surveys and potential additional research needs.

6.9 RED TREE VOLE CONSERVATION PLAN

The conservation strategy for this species has a habitat-based approach. Specifically, the silvicultural requirements associated with RMZs, mass-wasting avoidance strategy, cumulative effects/disturbance index restrictions, marbled murrelet conservation areas, and the retention standard of 10 percent late seral habitat for each watershed assessment area are likely to provide habitat for red tree voles.

There is little published literature available on habitat use and population status or trend of red tree voles in California. Anecdotal information from several sources in northern California (CDFG, 1997) suggests a broader habitat usage than previously documented for red tree voles in Oregon. Additional information on habitat use is needed for this species.

6.9.1 Management Objective

Sustain viable red tree vole populations within each watershed assessment area on the PALCO ownership, through the life of the permit.

6.9.2 Conservation Measures

Late seral habitat retention on the ownership, through the life of the permit, is expected to provide sufficient habitat in terms of quantity, quality, and distribution to support a viable

population. CMZs and RMZs are expected to provide connectivity across the landscape. In many locations, CMZs and RMZs will intersect with other RMZs or be augmented by habitat subject to silvicultural restrictions (e.g., NSO activity sites, mass-wasting sites, or steep slopes adjacent to RMZs). These areas, MMCAs, and adjoining public lands will form an interconnecting network of habitat which is expected to maintain the species in the Humboldt, Yager, and Van Duzen WAAs. PALCO land within the Bear, Mattole, and Eel WAAs is not expected to provide blocks of late seral habitat through the life of the permit. Late seral and old growth habitat on public lands adjacent to PALCO ownership in these WAAs is expected to provide suitable habitat for the species.

6.9.3 Implementation/Compliance Monitoring

Seral stage distribution will be tracked and reported as described in the conservation measures described in this appendix under Section 6.11, Measures to Conserve Habitat Diversity and Structural Components.

6.9.4 Effectiveness Monitoring and Adaptive Management

Within one year of permit issuance, PALCO, USFWS, and CDFG will jointly develop a research/monitoring effort to examine red tree vole habitat seral stage use and habitat connectivity requirements on PALCO lands. The objective will be to determine conditions needed in younger forests to provide for and promote opportunities for maintaining tree vole populations capable of interbreeding and dispersing to other suitable habitats. Survey methodology will be based on the draft study plan developed by the Pacific Northwest Research Station (Biswell, 1997).

The research/monitoring project will begin by the end of the second year after permit issuance. Five years after starting the research monitoring project, PALCO, USFWS, and CDFG shall meet to review the results of monitoring/research activities and any other new information available on the species. Analysis of the habitat considered to be capable of supporting red tree vole populations will include an assessment of total acreage and habitat connectivity based on available information on the dispersal capabilities of the species. This information will be used to evaluate the effectiveness of conservation measures and evaluate potential changes to the measures. If PALCO, USFWS, and CDFG cannot reach consensus on changes necessary for the OCP, USFWS, and CDFG may terminate coverage for the California red tree vole under the ITP.

6.10 AMPHIBIAN AND REPTILE CONSERVATION PLAN

6.10.1 Management Objectives

Sustain viable populations of the northern red-legged frog, foothill yellow-legged frog, tailed frog, southern torrent salamander, and the western pond turtle within each watershed assessment area in which they occur on the PALCO ownership, through the life of the permit.

6.10.2 Conservation Measures

Conservation measures outlined in the Aquatics Conservation Plan are expected to provide for sustainable populations of these species where suitable habitat types occur across PALCO's ownership. This plan outlines interim habitat protection measures for aquatic and adjacent

riparian habitats, as well as upslope management practices that are designed to reduce impacts to aquatic resources.

As part of the watershed analysis process, an amphibian and reptile assessment module shall be developed. The module will include key and critical questions regarding life history requirements, including those upslope of the RMZ boundaries. It will be part of every watershed analysis conducted under the Plan. Results from this module shall be integrated into synthesis and prescription development to minimize and mitigate management effects on all phases of life history. Refer to the Aquatics Conservation Plan for additional information.

6.10.3 Monitoring

Refer to the Aquatics Conservation Plan for a description of the implementation/compliance and effectiveness monitoring.

6.11 MEASURES TO CONSERVE HABITAT DIVERSITY AND STRUCTURAL COMPONENTS

6.11.1 Management Objective

6.11.1.1 Habitat Diversity

Ensure that a mix of vegetation types and seral stages are maintained across the landscape over the permit period.

6.11.1.2 Structural Components

Maintain and recruit sufficient amounts and distribution of forest structural components to contribute to the maintenance of wildlife species covered under the ITP.

6.11.2 Conservation Measures

6.11.2.1 Habitat Diversity

At the end of each five-year period, PALCO will report the seral stage distribution for each hydrologic unit to gauge conformity with projected forest seral types for the plan area described in the final SYP, as approved by CDF, and demonstrate compliance with the following measure in the HCP:

Throughout the planning period, PALCO's forested lands within each WAA will include at least 10 percent late seral, 5 percent mid-successional, 5 percent young forest, and 5 percent forest openings.

6.11.2.2 Habitat Structural Components

- All snags (standing dead trees) that do not constitute a safety hazard to workers will be retained during timber harvest.
- At a minimum, the following numbers of snags (conifer and hardwood) shall remain averaged over the THP area following timber harvest and site preparation (larger snags may be substituted for smaller snags):
 - 1.2 snags per acre over 30 inches dbh and over 30 feet tall
 - 2.4 snags per acre over 20 inches dbh and over 16 feet tall
 - 1.2 snags per acre over 15 inches dbh and over 12 feet tall

- Snags in RMZs adjacent to harvest units may be counted toward the objective, but at least half the snags in each size category must be outside Class I and II RMZs.
- If snags are not present to meet the above objective, green trees in the same size categories shall be retained in numbers sufficient to meet the objective. Conifer species other than redwood shall have priority for retention. Green trees identified as replacement trees for snags shall be retained during subsequent timber harvest entries through the permit term.
- In the event of an emergency (as described in Section 1052.1 of the FPRs), such as wildfire or pest or disease outbreak, the requirement for retention of all snags may be waived through consultation with and approval by USFWS and CDFG.
- Retain at least four live cull trees per acre that do not constitute a safety hazard outside of Class I and II RMZs. Trees 30 inches dbh and trees with visible defects such as broken tops, deformities, or cavities will have priority for retention. Live cull trees may include trees with merchantable logs. These trees shall be retained during subsequent timber harvest entries through the permit term so long as they do not constitute a safety hazard.
- All live hardwood trees over 30 inches dbh that do not constitute a safety hazard will be retained following timber harvest and site preparation, to a maximum of two per acre. Hardwoods within all RMZs count towards this objective.
- Two logs per acre greater than 15 inches in diameter and over 20 feet long will remain following timber harvest and site preparation. One of these logs per acre must be in decay class 1, 2, or 3 (Maser and Trapp, 1984). Hollow logs over 30 inches in diameter will have priority for retention. Logs in Class I and II RMZs will not be counted toward this objective. There will be no requirement to leave down logs where they do not exist currently unless results of the first five years of monitoring indicate management objectives are unlikely to be met.
- Snag, live cull, hardwood, and down log conservation measures shall apply to THPs, timber harvest exemptions, and notice of emergency timber operations and will be evaluated based on the average number measured over a 40-acre harvest unit.

6.11.3 Monitoring

6.11.3.1 Implementation/Compliance

Due to the current lack of information regarding quantity and quality of snags and downed logs, monitoring is a key component of this strategy. Monitoring will develop data on these habitat components for each HU of the PALCO ownership.

- During preparation of THPs, the RPF (or designee) shall gather information on presence of snags, down logs, hardwoods, and live culls for inclusion in the habitat component monitoring process described below.
- Monitoring of snags, live culls, hardwoods, and downed logs will occur during reforestation inspections, timber stand improvement monitoring, or timber stand cruises. This monitoring program may be altered in the future, but any alterations made must conform to the standards set forth here, and those developed in consultation with USFWS and CDFG.
- A training program for RPFs, wildlife and fisheries biologists, licensed timber operators, and all other technicians responsible for implementing this strategy will

be designed and implemented. PALCO will work with USFWS and CDFG in developing the training program.

- At the end of the first year of plan implementation, PALCO will meet with the USFWS and CDFG to review the data collection and monitoring procedures and to determine if they are effective in producing the information required to implement the snag and downed log measures. Changes in procedures, if necessary, will be developed by PALCO in cooperation with USFWS and CDFG.

6.11.3.2 Effectiveness Monitoring and Adaptive Management

To ensure that the HCP measures will be effective in achieving the desired level and distribution of snags and down logs, PALCO shall conduct the following:

- After five years of plan implementation, the effectiveness of the recruitment measures will be evaluated against the objectives based on monitoring results and following an intensive inventory and measuring of stand components. If the snag objectives are not being met through the recruitment procedures identified above, PALCO will develop and implement aggressive measures. Such measures may include additional marking and retention of recruitment trees, girdling and inoculation of trees with pathogens to accelerate mortality and decay, or modification of site preparation techniques.
- In addition to the snag and down log inventories conducted during reforestation inspections, timber stand improvement monitoring, and timber stand cruises, a random sampling methodology will be developed in consultation with USFWS and CDFG and implemented on a 5- to 10-year basis throughout the life of the permit. This sampling design will follow the framework described in Volume 3, Part E, of the July 1998 Draft HCP for timber volume estimates.
- There will be no requirement to leave down logs where they do not exist currently until results of the first five years of monitoring have been evaluated. If the down log objectives are not being met through the recruitment measures identified in the HCP above, PALCO will develop and implement additional measures in consultation with USFWS and CDFG.
- The HCP monitor shall have full access to PALCO's land, at all times, to inspect any covered activity and shall be present onsite during every timber harvest conducted by or on behalf of PALCO. The HCP monitor shall also, at the request of the wildlife agencies, monitor the effectiveness of the HCP measures for retaining and recruiting structural components of wildlife habitat.

6.12 CONSERVATION PLAN FOR SENSITIVE PLANTS

6.12.1 Several Measures Necessary to Avoid Significant Impacts to Plants

Presence of rare species will be determined through field surveys conducted during planning of covered activities including, but not limited to, development of THPs, planning for new road construction, and development of quarries or borrow pits. The list of potentially occurring rare species (Table 3.9-4 of the FEIS/FEIR) will be updated each year by PALCO, using available information from CDFG, USFWS, NDDb and the California Native Plant Society (CNPS) inventory. Copies of this list shall be forwarded to CDFG, USFWS and CDF upon completion. For convenience, the term "rare" shall be used in subsequent text to refer to species listed as

endangered, threatened or rare, and additional species not yet formally designated by any government but which meet the criteria for listing (i.e., CNPS lists 1A, 1B, or 2).

The following procedures will be followed to provide a high probability that rare plants are discovered during the planning stage for covered activities and that mitigation necessary to avoid jeopardy and reduce impacts to a level which is not significant is accomplished.

1. Within 90 days of ITP issuance, a qualified botanist retained by PALCO shall review the plants identified in the July 1998 Draft HCP in Volume 1, Table 3, List B Species and Table 3.9-4 of the FEIS/FEIR. Based upon existing information, the botanist shall determine which habitat types/plant communities occurring within the covered lands may support these species.
2. Once the habitat types potentially supporting these species have been identified, a description or guide shall be prepared by the botanist and PALCO biologists to assist PALCO employees and contractors in identifying the presence of these habitat types when performing covered activities. These habitat guides may include text, photographs, lists of associated species, drawings, maps, and other resources identified by the botanist. These guides shall be submitted to USFWS and CDFG for review, comment, and final approval.
3. Within 12 months of issuance of the ITP, PALCO shall train RPFs and other appropriate employees and contractors in the use of the habitat guides to recognize potential habitat for rare plant species.
4. When planning covered activities, PALCO employees and/or contractors shall identify potential habitat that may be affected by a covered activity, PALCO shall retain a qualified botanist to verify the habitat determination and perform a survey, at the time of year appropriate to identify the subject species and at an intensity sufficient to detect presence of the target species.
5. Results of these surveys shall be included with any THP submitted to CDF for the subject project. The results shall also be submitted to USFWS and CDFG as part of PALCO's annual report and if requested by either of the agencies.
6. When rare plant species are detected in habitat that may be affected by a covered activity, PALCO shall implement feasible measures to avoid, minimize, and/or mitigate significant adverse effects to such species. These measures may include, but are not limited to, buffers, adjusting the location of covered activities, employing alternative methods of conducting covered activities (e.g., rerouting roads, narrowing roads, and using tractor or helicopter yarding). PALCO shall consult with USFWS for federally listed species and CDFG for all rare plant species. Such measures may be developed and proposed by PALCO, but they must be approved by USFWS, as appropriate, and CDFG. For THPs, USFWS, as appropriate, and CDFG shall recommend to CDF all feasible measures to avoid, minimize, and/or mitigate significant adverse effects, and CDF shall require one or more of such measures sufficient to provide such protection.
7. PALCO shall report locations of identified populations of rare plant species to the NDDB within 90 days of discovery.

6.13 THP CHECKLIST AND HCP MONITOR

PALCO resource professionals preparing THPs and timber harvest exemptions and agencies conducting the environmental review of PALCO's plans will be guided by the "Pacific Lumber Company Timber Harvest Plan Checklist." The checklist will be used to confirm that all relevant elements of the OCP are contained in the THPs and made enforceable under the THPs. PALCO and the wildlife agencies will revise the checklist during watershed analysis to create a THP checklist for each watershed to ensure implementation of watershed-specific prescriptions.

To monitor compliance with, and the effectiveness of, each of the OCPs above, PALCO shall fund a third-party entity or entities to monitor PALCO's implementation of the HCP OCP. This entity or entities shall be approved by the wildlife agencies to monitor on behalf of the wildlife agencies, is known as the HCP monitor, and shall operate under contract to CDFG. The HCP monitor shall also monitor the effectiveness of the Plan, if directed to do so by the wildlife agencies. The HCP monitor shall be qualified in forestry, fisheries biology, and wildlife biology. The HCP monitor shall have full access to PALCO's land at all times to inspect any covered activity and shall be present onsite during every timber harvest conducted by or on behalf of PALCO.

The HCP monitor shall report immediately to designated representatives of the wildlife agencies and CDF any deviations by PALCO from the conservation and management measures provided for under the HCP OCP. The wildlife agencies and CDF may then take appropriate action to enforce the federal permit and state permit, the California Forest Practice Act, and other applicable federal and state laws. The HCP monitor shall also report quarterly to the wildlife agencies concerning implementation and compliance by PALCO.

The intensity of the compliance monitoring by the HCP monitor will be reevaluated by the wildlife agencies at the end of the first 10-year period following the effective date of the HCP, and every 10 years thereafter, based on PALCO's record of compliance during the prior 10-year period.

6.14 STREAMBED ALTERATION AGREEMENT

Specific covered activities are subject to a streambed alteration agreement with CDFG, which is attached as Exhibit B to the IA. PALCO must comply with the terms and conditions of the streambed alteration agreement, which shall be administered and enforced by CDFG.